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GUIDELINES FOR PUBLICATION

1) All articles intended for publication should be submitted to the editors before the deadline which is usually six weeks before the release of the Journal
2) Submitted articles should be typed (or legibly printed) double-spaced, single-sided on paper 8½" x 11" (letter size) and they should not be more than 15 to 20 pages (3000 to 4000 words)
3) Illustrations, graphs, diagrams and figures should be put on a separate sheet and identified by Arabic numerals A list of explanatory legends for all the figures and diagrams should be put on another sheet Do not write on the back of photographs
4) References should be checked with the original sources, designated by Arabic numerals in the text, numbered in order of appearance and put on a separate sheet Each periodical reference should include in order the author's name and initials, title of the article, Journal name, volume number, page number and year (eg , 1 Rosen HJ. Lumbar Invertebral disc surgery. review of 300 cases *Can Med Assoc J . 101 317, 1969*)
5) The editors reserve the right to make such editorial changes as are deemed necessary to ensure correctness of grammar and spelling, clarification of statements and conformity to Journal style
6) Acceptance for publication is subject to the understanding that such material is submitted solely to the Journal and will not be reprinted without the consent of both the editors and author

Dietary Fibre: A Protective From Disease

Denis P. Burkitt M.D.

Born in 1911, in Enniskillen, Northern Ireland, Denis Parsons Burkitt had his upbringing in a family of deep Christian faith. By his own account, an undistinguished child at school (as many, so it seems, great scientists were), he attended Dublin University, initially intent on becoming an engineer. Realizing, however, that medicine was his calling, he subsequently switched to clinical studies, graduating from Dublin University in 1935 with Bachelors in Medicine and Surgery. Upon completion of his surgical training, he received his F.R.C.S. at Edinburgh in 1938. A voyage to the Far East—as a cargo ship's surgeon—sparked a desire to practise medicine in the underdeveloped world. As his biographer Bernard Glemser put it, Dr. Burkitt was "a surgeon with one eye and a burning missionary fever." (Dr. Burkitt had lost sight in one eye as a result of a childhood accident.)

After the Second World War, he was posted by the British Colonial Office to Lira, Uganda, where he ministered to the Africans as a "bush surgeon". In 1948, Dr. Burkitt was transferred to Kampala, Uganda. It was here that he first observed the illness that would later be known as Burkitt's lymphoma: a rapidly progressing, disfiguring cancer that usually afflicted children. Investigating cases on a 10,000-mile safari down the eastern flank of Africa, Dr. Burkitt established the peculiar geographical distribution of the disease, and its correlation with temperature and rainfall. The evidence gathered suggested that an infectious pathogen (later thought to be the Epstein-Barr Virus) and an arthropod (possibly the mosquito) vector were responsible. This aroused interest in international medical circles, for never before had such good clues been found for a possible viral etiology of cancer. Following speculation that the disease was related to other lymphomas and the leukemias, interest was further heightened when Dr.Burkitt reported achieving indefinite remission (a "cure"?) in some cases of Burkitt's lymphoma—and clinical improvement in most others—with single-dose chemotherapy. As the doting Bernard Glemser put it, "Denis Burkitt is unique. There is nobody quite like him in the history of cancer research."

In 1963 Dr. Burkitt returned to England, to join the Medical Research Council, and continue his research on geographical pathology. More recently, he has become renowned for his work on the importance of fibre and refined carbohydrates in the diet. The following is an invited commentary by Dr. D.P. Burkitt on Dietary Fibre: a Protective from Disease.

At a recent conference on fibre at the Royal Society of Medicine in London, England, the head of the Department of Nutrition at London University, Professor Arnold Bender stated it as his opinion that the study of Dietary Fibre was the fastest moving subject in the field of medical science today.

Some 10 years ago less than 5 papers on the subject appeared annually in scientific journals. Nearly 400 were published last year alone.

The concept of the value of fibre is not new, but from being considered an example of food fadism it has moved into the realm of well-attested scientific fact and is currently engaging the attention of leading gastroenterological, diabetic, cardiovascular and nutritional units throughout the world.

Far too late it has earned entry into the cumulative *Index Medicus*, but regrettably under the misleading heading "Cellulose", to which the enquirer is referred when he looks for references on fibre. Two of the falacious traditional concepts of fibre that need to be buried are that it equates with either cellulose, or with the previously but no longer relevant term used in food tables, "Crude fibre." A third is that food rich in fibre must be tough and stringy, and from this derives the fourth misconception that fibre can be irritating to the lining of the alimentary tract.

Appreciation of the medical value of fibre is not new. A Persian

physician named Hakim in the 9th century wrote - "wheat is a beneficial cereal. Chappatis are made from wheat flour. The chappatis containing more bran come out of the digestive tract quicker but are less nutritious. Chappatis containing a little bran take a long time to be excreted."

In the last century Dr. T.R. Allinson was so convinced of the efficacy of wholemeal bread in combatting constipation that he manufactured and sold a wholemeal loaf still available today as "Allinson's bread." For advertising the product, his name was erased from the medical register and his name-plate outside his London consulting room read "Dr. Allinson, Ex. L.R.C.P."

He had the remarkable foresight to write in an essay published in 1890 the following prophetic words..."The innutritious bran...by its bulk...helps to fill the stomach and keeps us from eating too much. It also aids in filling up the small intestines, and stimulating the involuntary muscles of the bowels, thus causing daily laxation.

"One great curse of this country is constipation of the bowels, which is caused in great measure by white bread. From this constipation comes piles, varicose veins, headaches, miserable feelings, dullness and other ailments."

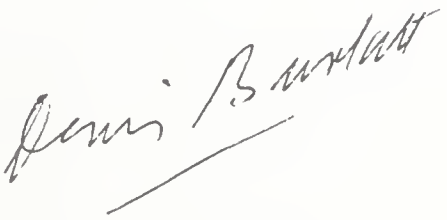
These early pioneers were viewed as cranks, a fate that has been common to many major benefactors of mankind. One of those most responsible for the current upsurge in interest in this hitherto neglected Cinderalla of Nutrition, was a British physician, Surgeon-Capt. T.L. Cleave. He too laboured for years under the undeserved label of crank, but his perceptive thinking and logical deductions from observed facts increasingly persuaded those prepared to listen and look, including myself. The voice of Walker was speaking on the subject with clarity nearly 30 years ago, to be followed by Painter's major contribution to the new understanding of diverticular disease, and Hugh Trowell's vision of the importance of fibre as a factor protective against a wide spectrum of human diseases.

Fundamental advances were made in the understanding of its chemistry and composition by Southgate in England and Van Soest in the U.S.A. Heaton, Cummings and Eastwood made major contributions in England while Kritchevsky and his colleagues spearheaded research into the implications of fibre in cardiovascular disease. Concurrently the work of Anderson in America and Jenkins in England has shown the relevance of fibre in the prevention and treatment of diabetes.

It was the recognition that many diseases characteristic of, and common in, Western countries were rare and in some instances virtually nonexistent in tribal communities in the third world that was largely responsible for the search for valid reasons for this phenonema. Epidemiology, while unable to prove cause and effect relationships, forced the inescapable conclusion that many of our commonest diseases must be potentially preventible could we but identiy causative factors.

The approach adopted by certain pseudo-authorities, that action must await proof, is both scientifically unwarranted and morally unjustifiable. Snow's recognition of a relationship between sewage contaminated water and cholera reduced the incidence of the disease and saved hundreds and lives decades before the responsible vibrio was identified.

Capt. Cook, acting on Lund's observation that lemons protected against scurvy, lost not a man from this disease on the historic voyage on which he discovered New Zealand. Not till long after was vitamin C isolated, and not till later still was its action understood. Enough is known about fibre to unhesitatingly recommend a return to a diet richer in this all important ingredient. □



Dietary Fibre And Nurtition

Davy C.H. Cheng M.Sc. 8T3

Fibre has erupted into the limelight of popular nutrition. Both the nutrition recommendation for Canadian and Dietary goals for the United States emphasize an increased consumption of whole grain products, fruits and vegetables. This is mainly due to the suggestion that lack of fibre in the Western diet is partly responsible for several common diseases. These include diverticular disease, colonic cancer, appendicitis, irritable bowel syndrome, diabetes, coronary heart disease, hemorrhoids, varicose veins and others. Evidence is epidemiological and based on associations between disease prevalence and diets of population groups.

Long ignored, fibre is assumed in most nutrition textbooks to be inert and of no value in the diet. The readdressing of the fibre problem has necessitated a redefinition of terms and re-education of human nutritionists and medical personnel.

Dietary fibre is comprised of the polysaccharides and associated substances of plant origin which are resistant to the digestive enzymes. Fibre includes carbohydrate compounds: cellulose, hemicellulose and pectin, and some non-carbohydrate fractions: lignin, cutin, resistant proteins and minerals.

Substances that are resistant to the secreted enzymes are termed unavailable but not indigestible. Digestibility refers to lack of fecal recovery. Many fibrous carbohydrates are 'unavailable' but 'digestible' in that they disappear through fermentation in the large bowel. Carbohydrates such as cellulose, hemicellulose, and pectin are considered 'unavailable' in the sense that they yield no sugar upon digestion. However, the products of their digestion provide metabolizable energy to the host animal mainly as volatile fatty acids, primarily acetic, propionic, and butyric acids. Recent evidence shows virtually complete absorption of volatile fatty acids in man and other monogastric animals.

Whole grains, light milled wheat, rice or corn products, whole bran breakfast cereals, and many fresh fruits and vegetables all contain fibre. Except for bran and bran products, none of these would make a very substantial difference to total fibre intake unless consumed in rather large amounts.

Role of Fibre in the Diet

Fibre and Disorders of the Alimentary Tract

Dietary fibre intakes in Britain are around 20g/day and are low compared with estimated fibre intakes in less industrialized communities. Such intakes are associated with low fecal weight, and with a relatively high incidence of bowel disorders.

Burkitt believes that this is because persons on refined diets pass stools that are small, stiff and have a long intestinal transit time. This results in relatively long periods of contact between the mucosa and the intestinal contents, and in strained defecation. This is believed to lead to hypertrophy of the bowel muscle, a tendency to pouching, and a greater likelihood of irritation and inflammation once diverticuli have formed.

A high fibre diet increases fecal bulk, produces more frequent bowel movements with softer stools, and decreases transit time through the entire gastrointestinal tract. Only fibre sources like bran or wood cellulose that have an indigestible residue will enhance transit. The highly fermentable fibre of vegetables, such as cabbage, have little effect on fecal volume or transit (pectin normally are completely fermented), although they may greatly alter the fecal composition by increasing the water and nitrogen content of the stool. Moreover, fineness of grinding has negative effects upon fibre quality. Finely ground bran has a much reduced effect upon stool volume, transit, and stool composition when compared to unground bran. As a result, the optimum quality of dietary fibre would be obtained from coarsely ground whole cereal grains (or their brans), supplemented with fruits and vegetables. None of the cereals contain appreciable pectin (highly fermentability) while few of the fruits and vegetables contain lignin (high residue). A high fibre diet can therefore be used safely to treat constipation and has none of the adverse side effects of most laxatives.

Again, epidemiological data indicate that low intakes of dietary fibre have been linked with colonic cancer, appendicitis and the irritable bowel syndrome. Varicose veins, hemorrhoids and venous thrombosis in the leg may be produced by

PLEASE NOTE

The heading on page 36 should read:

Dietary Fibre And Nutrition

pressure in veins returning from the affected areas. Chronic constipation or frequent strained defecations may play a role in the etiology of these conditions.

Fibre and Obesity

The pathogenesis of atherosclerosis and coronary heart disease includes the following risk factors: hyperlipidemia, obesity, hypertension, diabetes, cigarette smoking and family history of an early onset of coronary heart disease.

Statistically, there are approximately 80 million overweight persons in America - 20 million of these are clinically obese (more than 20% above normal weight). These may also be related to a low fibre intake. In the past 100 years there has been a decrease both inthe fibre consumption of fats, sugar and animal products. Today, most people we know are "on a diet" - usually to lose weight, hence the term "dieting". The approaches to the problem of weight reduction may take several forms: nutritional education and diet, exercise, drug therapy and surgery.

It has been shown that high fibre bread diet may be effective on weight loss. It is not high in calories and can curb hunger pangs enabling the dieter to resist food that otherwise would cause excessive calorie intake.

Fibre and Diabetes

The incidence of diabetes mellitus is low in ethnic groups such as Yememite Jews, South African Bantu, and New Zealand Maori who consume large quantities of dietary fibre. However, the incidence of diabetes is higher in members of such groups who have adopted Western patterns of living and, thus, decreased their consumption of polysaccharides and dietary fibre. The hypothesis that the beneficial effect of complex carbohydrates is due to the smaller increase in blood sugar levels that occurs after their ingestion than after ingestion of equivalent amounts of refined carbohydrates has recently been confirmed by Jenkins et al. They found lower postprandial glucose and insulin responses in healthy volunteers when guar flour, pectin, or both were added to the carbohydrate load. Their data suggest that the presence of unabsorbable carbohydrates in a meal may limit the rise of blood glucose and insulin that follows a meal containing carbohydrates.

Further studies indicate that non-absorbing carbohydrate flattens gluscose-tolerance curves, lowers the fasting plasma glucose, and reduces urinary glucose excretion. A variety of high-fibre substances have been used but viscous guar gum is said to be most effective. It is suggested that the viscous nature of guar gum suspension is probably responsible for a delay in the rate of gastric emptying. Clearly, further studies are necessary to delineate the mechanism of modification of absorption in the small bowel. These reports emphasize the efficacy of guar gum but make no direct mention of its unpalatable properties, even when cooked.

Recently, Munoz et al reported that the effects of the dietary fibre sources on carbohydrate metabolism seem dependent on the composition of the source. The improved oral glucose tolerance is associated with improved insulin release and peripheral insulin sensitivity and decreased plasm glucagon concentrations, these effects may be useful in the dietary control of diabetes. Furthermore, Albrink et al suggest that carbohydrate induced hyperlipemia does not occur if the high carbohydrate diet is rich in dietary fibre, and that the insulin stimulating potential of foods in a very high-carbohydrate diet is a ritical determinant of the magnitude of carbohydrate induced lipemia.

Fibre and Hyperlipemia

The correlation of high-fibre diet and hyperlipidemia is still a controversial issue. Physiological studies in man have shown pectin to have pronounced hypocholesterolemic properties but little effect on bowel habit. Therapeutically, pectin has been used to prevent the dumping syndrome, whilst along with similar types of fibre it may be useful in the treatment of diabetes. Although pectin has a high uronic acid content and is known to complex readily with calcium and other cations, it is shown to exert no effect on calcium balance in man.

In contrast, Raymond et al showed that high-fibre intake seems to be ineffective in lowering serum lipid levels. In a study by Van Berge-Henegouwen et al feeding a

(continued on page 62)

"What have we got without sugar, salt, cholesterol or margarine, that contains Vitamins A, B, and C with wheat germ?"

Dietary Fibre And Cardiovascular Disease

Alexandra Berezowskyj 8T2

By far the greatest change in the health profile of the Western world over recent decades has been the replacement of the acute infectious diseases by their chronic counterparts, cancer and cardiovascular disease. Cardiovascular disease in particular, has reared its ugly head as the greatest contributor to the mortality and morbidity statistics of the middle-aged population.

In 1910, coronary artery disease was considered by Osler to be a rarity and as late as 1925, Sir John McNee saw fit to describe to English physicians two cases of this "rare condition" he had encountered in the United States.

Being for the most part of unknown or unconfirmed etiology, these diseases have nevertheless become linked to a variety of risk factors. The three major risk factors associated with premature atherosclerosis and coronary heart disease are hypercholesterolemia, hypertension and cigarette smoking, while diabetes mellitus, obesity, lack of exercise, stress and family history are also thought to play a role. The venous disorders, such as hemorrhoids, varicose veins and deep vein thrombosis, have less specific risk factors. The first two are more common in constipated patients, whereas phlebothrombosis is most often associated with immobilization, heart failure, atherosclerosis, varicose veins and cancer.

Recently, the work of Burkitt and Trowell has led to the proposition of yet another risk factor, one which may offer a common explanation for the variety of cardiovascular diseases mentioned. Their observation of populations where these afflications are exceedingly rare have given birth to the hypothesis of lack of dietary fibre as the predisposing cause of arterial, venous and thrombotic disorders.

Epidemiology

A wealth of epidemiological evidence exists to provide a basis for this theory. The prevalence of cardiovascular disease in western countries is very high in comparison to the developing areas of the world, such as Africa, Asia and the Middle East, where they are quite rare. The typical western diet derives approximately 40% of its calories from fibre-free fat and 33% from starches, most of which are highly processed, low fibre white flour or rice. In developing countries, 75% of dietary energy comes from unprocessed, fibre-rich starchy foods, while only 12% is contributed by fat. Although other dietary differences occur between these two populations, in the estimation of Burkitt and Trowell, the largest single variation is in the amount of fibre that surrounds the energy foods.

Rural communities in Africa, Asia and tropical America, whose diet consists of high fibre starchy roots, and even in urban dwelling South African Bantu, who consume large amounts of cereal products, show low serum cholesterol levels and very low incidence of ischemic heart disease. In one South African hospital admitting 40,000 Bantu patients per year, the number of cases of I.H.D. recorded between 1960 and 1972 was thirty. In northern India and adjacent Middle Eastern countries, where large quantities of dried leguminous seeds are eaten, the serum cholesterol level and I.H.D. incidence is again seen to be very low. These legumes have the richest fibre content of all vegetable foods and contain 2 to 3 times the amount of fibre as does an equal weight of whole wheat bread. In Ireland, where fibre-rich potatoes are a major dietary constituent, the prevelance of I.H.D. is significantly lower than in other western countries. A study done on 1154 Irish brothers, one of whom lived in Ireland and the other in Massachusetts, showed a lower percentage of ECG evidence of I.H.D. in the brothers living in Ireland. Both groups had a similar intake of alcohol and foods other than fibre-rich carbohydrates, as well as similar smoking habits and blood pressures. Interestingly, the Ireland group, although consuming somewhat more animal fat than their American counterparts, had lower serum cholesterol levels.

Fibre Intake

The emergence of cardiovascular disease in the West correlates well with changing food intake patterns. In the United States the consumption of whole wheat flour fell from 160 lbs. per capita in 1900 to 100 lbs. per capita in 1970. Between the years

1940 to 1970 the consumption of fresh fruits and vegetables fell from 250 to 180 lbs. per capita, while during this same period, the use of low fibre processed fruits and vegetables rose from 65 to 110 lbs. per capita. The increase in use of refined sugar seen in the last century is thought to have contributed to lower fibre intake, since it tends to replace the consumption of starchy foodstuffs which contain fibre.

The discrepancy in cardiovascular disease prevalence cannot be ascribed to genetic differences between these populations. Both black and white Americans have similar levels of disease, whereas American and African Negroes show no comparison. Also, Japanese immigrants to Hawaii are more often affected than inhabitants of Japan. Similar trends toward increased disease prevalence occur in New Zealand Maori populations in contrast to the less developed Polynesian Island natives. The effect seems rather to be associated with environmental factors.

In areas where fibre intake is high, the other risk factors for cardiovascular disease play a diminishing role. For example, in Ireland, land of the fibre-rich potato, smoking, fat intake and hypertension are comparable or greater than in other western countries, yet the prevalence of I.H.D. is lower. In Africa, cigarette smoking, obesity, hypertension and diabetes are not associated with I.H.D. As well, the protection against CVS disease which is ascribed by some to increased physical activity may in fact be due to its tendency to increase the consumption of fibre-containing starchy foods.

Experimental Work

Various criteria, some of them imprecise and unrelated to the physiological situation, have been used in experimental studies to estimate the fibre content of diets. This has served to confuse and hamper fibre research. Dietary fibre (DF) has most recently been defined as the ingested plant material which is not digested by enzymes in the gastro-intestinal tract. It consists of cellulose, hemicellulose, mucilages, pectins, gums and lignin. Many experimentors have made use of the crude fibre (CF) estimate, which is that portion of plant food resistant to hydrolysis by dilute acid and alkali. This measurement (CF), listed in food composition tables, underestimates the DF content of foods by approximately 50%, and it has been suggested that it be abandoned in favor of the latter term. The major sources of dietary fibre include whole grains, vegetables and fruits. Modern processing of foods reduces their fibre content significantly.

Although work on the metabolic effects of dietary fibre began in the 1930's, it was mostly concerned with its laxative properties. It has only been in the past 15 to 20 years that an interest has been shown in the relationship of fibre to lipid metabolism and atherosclerosis. Animal studies have shown that fibre decreases the severity of atherosclerosis produced by diets high in saturated fats, as well as increasing the fecal excretion of bile acids and neutral steroids. Experiments done on humans have produced very similar results. South African prisoners were fed four different diets containing either 40% or 15% of calories as fat and either 4 or 15g of fibre. In both high and low fat intake groups, high fibre intake resulted in lowering of serum lipids and increased excretion of fecal steroids. A similar study on two broad types of diet, American and Italian, found that in both low and moderate fat versions of each, the Italian diet showed significantly lower serum cholesterol levels. The major difference between these two diets was the higher intake in the Italian diet of fruits and vegetables, especially of the leguminous type. In each of twelve experiments where complex carbohydrates such as fruits, vegetables, legumes, cereals, potatoes and bread were substituted for sucrose in the diets of people with normal serum lipid profiles, a significant lowering of serum cholesterol levels was noted. A study done on thirteen diabetic men put on a 2200 calorie diet which increased their carbohydrate intake by 77%, their ratio of complex to simple carbohydrates from 1.15 to 2.63, and their fibre level from 4.7 to 14.2g per day, showed not only lowered serum cholesterol and TG levels of 25 and 15% respectively, but also a 26% decrease in glucose level.

Recently, more work has been done on elucidating the effects of the various components of fibre on these same parameters. It has been shown in numerous animal and human studies that bran or cellulose alone do not produce either hypocholesterolemia or increased excretion of bile acids and steroids. On the other hand, guar gum, found in the seeds of a leguminous bean plant and used as a thickener in sauces, and pectin, used as a gelling agent in jams, have both been found to lower serum cholesterol and increase bile acid excretion in healthy volunteers eating their normal diet.

Mechanisms of Action

The mechanism which has been postulated to explain the role of dietary fibre in lowering serum cholesterol and protecting against atherosclerosis is related to both the absorption and enterohepatic circulation of this plasma lipid. Serum cholesterol is derived from the diet and endogenous synthesis. The major catabolic pathway is conversion to bile acids in the liver, and the main excretory route for both cholesterol and bile acids is via the feces. Therefore, any substance which could either decrease absorption of cholesterol or increase excretion of it and bile acids, could conceivably decrease serum cholesterol levels. Most of the cholesterol in the small intestine is undissolved and can be trapped in meshes of dietary fibre. In this way, its absorption may be decreased. Various fibre components have also been shown to bind bile acids, preventing their reabsorption in the enterohepatic circulation and increasing their excretion. This would increase the turnover of cholesterol into bile acids, deplete the body pool, and therefore lower the blood cholesterol level.

The possible method by which fibre protects against venous disorders is related not to its metabolic function, but rather to its laxative effects. It is thought that the increased abdominal straining in constipated

(continued on page 62)

Dietary Fibre And Gastrointestinal Disease

Marion Frendo 8T2

The role of fibre in the human diet has largely been overlooked until the last decade because it seemed to have nothing to offer in the form of nutrition. Fibre passes through the digestive tract relatively unaltered by the digestive enzymes, although there is a minimal degradation of it into substances that can be utilized by the bacterial flora of the large intestine. This attitude has led to the increasing removal of fibre from the diet through refining. Nevertheless, it stands to reason that its presence or absence in the gastro-intestinal tract should have some effect since this would contribute to the environment in which this system must work. Environment has been implicated in a multitude of other disorders, so why should it not also influence gastrointestinal disease?

The major components of fibre are cellulose, hemicellulose, pectin and lignin — the constituents of cell wall material. Dietary sources of fibre include fruits, vegetables and whole grain. As related to gastrointestinal functional effects, bran has consistently been shown to be superior. Its crude fibre composition is 9% compared to 1.6% for whole wheat bread, 0.5%-1.0% for fruits and vegetables and 0.2% for white bread. The crude fibre content, which is determined by measuring the residue after treating the substance in question with dilute acid and dilute alkali, only represents the cellulose and lignin portion, which is roughly 50% of the true fibre content. However, these measurements can be misleading because the proportion of each constituent varies not only with the source, but also with the age of the cell walls in question. This has led to a great deal of controversy as to the effectiveness of fibre which can only be resolved if some more consistent form of measurement is devised.

Among the gastrointestinal disorders in which a causative role for decreased fibre intake has been suspected and sometimes substantiated are constipation, appendicitis, diverticular disease, irritable bowel syndrome, colonic cancer, ulcerative colitis, hiatus hernia and gallstones. The original evidence is mostly epidemiological, but experimental studies are often supportive. In general terms, these conditions are comparatively rare in developing nations, where the fibre consumption is high, and quite common in Western nations, where only about a fifth as much fibre is included in the diet. Even in countries where the incidence of these diseases is low, it is significant to note that the individuals who present with these disorders are usually urban dwellers and members of that portion of society who tend to adopt a Western diet. There is also a time relationship which has been established in that it is not until this past century that many of these conditions were ever heard of, and, this correlates with the time at which the decrease in fibre in the diet, through refining, began. At first, the disorders only appeared in members of the upper class because only they could afford the expensive fine food. Now, these products tend to be among the least costly commodities and so everyone suffers. In summary, the major contrasts between food eaten in developed and developing countries are, in many respects, similar to those between present and past diets in Western Europe and in North America.

Mode of Action

If fibre has no nutritional value and passes through the body unchanged, it is difficult to conceive of how it works. Basically, the effects of fibre depend on its ability to hold water. Hemicelluloses and pectin are hydrophilic substances and it is their ability to form an osmotically active gel with water that is the basis of their influences on gastrointestinal function and disease. Because less water is absorbed, the mass of the faeces excreted increases, hence the term 'bulking agent'. Since a larger mass of material is moving through the colon and this mass is softer (because of the water contained within it), less contraction of the colonic musculature is necessary and less pressure need be generated for the contents to be propelled. This not only results in a decrease in transit time, but also in a colon which, because it need contract less forcefully, has a wider lumen, Fig. I. The other major effect of an increased water content of the faeces is that the concentration of each component is decreased and soluble materials are held in inter-

stices of the fibre or are held by chemical and physical mechanisms in the gel structure. To illustrate what type of an influence these actions have, it has been found that the small intestine becomes less efficient at absorbing nutrients as fibre intake is increased because the contents pass through more quickly and are hindered from diffusing into the mucosa by the gel's action.

Constipation

In constipation, the effect of fibre in relieving this condition is fairly straightforward. By decreasing transit time and softening the faeces, constipation is alleviated. Clinically, addition of fibre to the diet is an accepted treatment in this instance. This natural alternative is preferable to the other laxatives - for example, senna destroys the colon's intrinsic nerve supply. Bran allows the colon to work the way it was designed to. The effectiveness of fibre in relieving constipation has been documented for over 30 years. But, it is important to remember, with geriatric patients especially, that fluid intake must be maintained at an appropriate level for fluid balance not to be disturbed.

Appendicitis

Appendicitis, the most common cause for emergency abdominal surgery in North America and England and yet still very rare in rural Africa, appears to have some origin in decreased fibre intake. On emigration of an ethnic group from a country where fibre consumption is high to one where it is low, the prevalence of appendicitis among that sector increases. This is illustrated by the greater occurrence of it in the Japanese of Hawaii than in those in Japan. Appendicitis is the only non-infective disease of the bowel which increases in incidence within a few months of entering a new environment. The postulated mechanism for the way fibre may play a role in preventing appendicitis is based on the idea that an increase in intraluminal pressure of the intestine is the inciting incident leading to appendicitis. If the faeces are hard, the intraluminal pressure is necessarily raised in order to move them along. An increase in pressure has been shown experimentally to result in devitalization of the mucosa, allowing bacteria to proliferate freely in the affected area. In response to

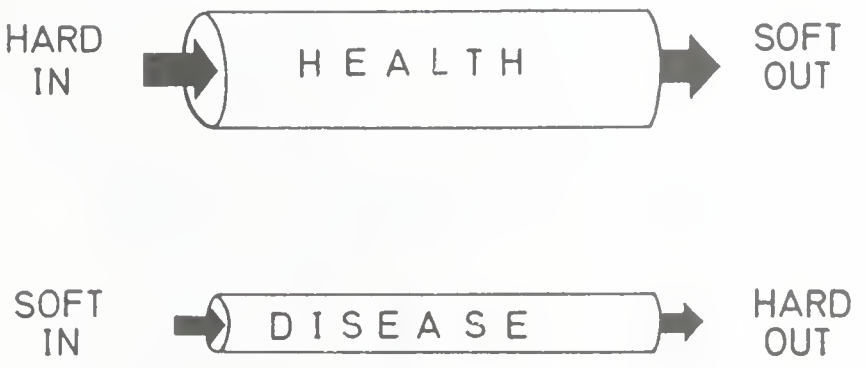


Fig. I: Reciprocal relationships between the consistency of food and stools.

this, inflammation occurs in the form of appendicitis. By maintaining a soft consistency to the faeces fibre would appear to be protective against appendicitis.

Hiatus Hernia

Hiatus hernia occurs when part of the stomach protrudes through the esophageal hiatus of the diaphragm. It is thought to be an acquired defect because it is found rarely in early life and increases in incidence with age. The explanation for its occurrence appears to be related to constipation. The increase in intra-abdominal pressure which occurs with straining at defecation is suspected of causing the stomach to herniate through the diaphragmatic hiatus, the path of least resistance, Fig. II. The relief of constipation should prevent this.

Ulcerative Colitis

In the case of ulcerative colitis, a disease characterized by ulceration of the colon and rectum, the evidence is confusing and epidemiological information is contradictory. The experimental data includes a study which was done with 39 patients who were in clinical remission from this disease, maintained by sulphasalazine. Withdrawal of this drug leads to a relapse rate of 70% within 6 months. Fifteen of the group were maintained on the drug. The other 24 started on a diet of high fibre in the form of bran and 2 weeks later discontinued the drug. Four of the 24 dropped out because they could not tolerate the diet. Six months later, the group who stayed on sulphasalazine had a relapse rate of 20% whereas the high fibre group relapsed at a 75% rate. The risk of relapse was found to be independent of the duration of remission. From these results, it seems that fibre does not maintain remission. In terms of the causation of ulcerative colitis, however, fibre may still have a role. Whether it is preventative or causative is unclear.

Diverticular Disease

Diverticular disease can be closely associated with a decrease in fibre intake. Virtually unknown up until the time when the refining of cereals began, its geographic pattern of distribution now fits that of a diet related phenomenon. Diverticulosis

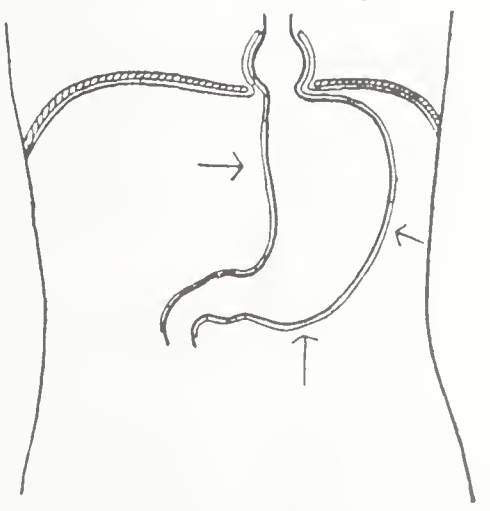


Fig. II: Diagrammatic representation of postulated relationship between raised intra-abdominal pressures and hiatus hernia.

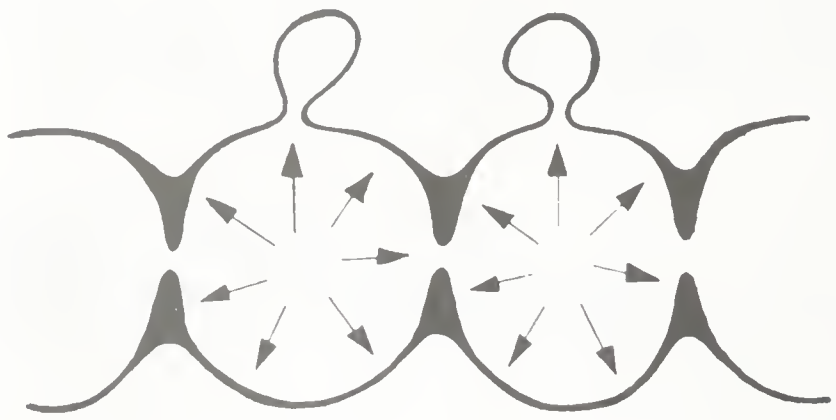


Fig.III: Diagrammatic representation of the manner in which excessive segmentation can convert the lumen of the colon into "little bladders" in which pressure can build up and force diverticula out between fibres in the colon wall.

is the occurrence of little sacs or outpouchings in the wall of the colon. The method by which this is believed to occur is through an increase in the intraluminal pressure of the colon which is generated when the muscle of the bowel is contracting down. When the pressure which is necessary to move the faeces is exceedingly great, something must give. Since the wall of the colon between the contracting muscle fibres is rather weak, some of the pressure is released in this area by forcing the wall out, Fig. III. This most likely to occur in individuals who consume small amounts of fibre, whose faeces will tend to be small and hard and therefore require more pressure to be pushed along. The diverticulosis may then be aggravated as a combination of food residues and bacterial action may lead to inflammation, diverticulitis.

In an experimental study done on a fairly random group, vegetarians, whose mean fibre intake was 41.5g/day, were compared to non-vegetarians, who consumed 21.4g/day. These were symptomless individuals who were subsequently screened for diverticulosis: 12% in the vegetarian group, and 33% in the non-vegetarian section. Interestingly, the vegetarians with diverticular disease had a lower mean intake of cereal and total fibre than the remainder of the vegetarian group.

Many studies have tested the effectiveness of fibre in relieving the symptoms of diverticular disease which include constipation, diarrhea, pain and distention. The increase in colonic contents of a less viscous nature which occurs when fibre intake is increased, by increasing intraluminal width and opposing the activity of smooth muscle, causes a decrease in intraluminal pressure. Alleviation of symptoms occurred in over 86% of patients in one study and the overall results are such that fibre is an accepted treatment for diverticular disease. Another study which illustrates how effective fibre is as a treatment had a group of patients on a diet of high fibre crisp bread as a supplement. In 71% of the cases, the symptoms were controlled. When they were then switched to a standard, low fibre diet their symptoms reappeared. Of the different preparations of fibre that have been tested, bran appears to be the most beneficial.

Irritable Bowel Syndrome

Irritable bowel syndrome which is felt to be preceded by diverticular disease, occurs when the normal peristaltic contractions of the colon are replaced by irregular ones. These result in varying amounts of water absorption from the contents, usually too much or too little, so that constipation or diarrhea occurs. Pain is also characteristic as a result of spasms or an increased number of contractions. On a diet with 8-10 teaspoons of bran per day, 23 out of 30 patients showed improvement in their conditions.

Cancer of the Colon

The role that fibre may play in the prevention of colonic cancer is an important one. Cancer of the colon is the second leading cause of cancer death in North America and has its highest incidence in urban societies. Fig. IV shows that the lowest incidence is in those areas with an established high fibre intake.

The manner in which fibre is believed to exert its protective actions is a many faceted one. To begin with, if there are any carcinogens present in the faeces, the fact that they will be less concentrated in a larger volume that results from a high fibre diet, should lead to their being less potent. Also, as fibre reduces the transit time, there is less time for which the carcinogens can act on the colonic mucosa. When a decrease in fibre intake is coupled with an increase in fat intake, as has occurred in our society, the concentration of bile acids in the intestine increases. One of these bile acids, dehydroxylate cholate, when acted upon by the anaerobic bacteria found in the colon, is transformed to deoxycholate, a known carcinogen in animals. Fibre provides a physical barrier against this occurring as well as decreasing the possibility of this happening by time and concentration factors. It is important to mention that the bacteroides which are capable of causing this transformation are more prominent in the intestinal flora of people from countries with a high incidence of colon cancer; so, this factor as well is acting against them.

In four studies done to see if fibre could affect the intestinal flora of an individual, no change in the major types or concentration in the faeces was detected. But, because more material is being excreted daily, the actual number of bacteria lost daily must also be increased if the concentration does not change. Some benefit may ensue as a consequence of this increased turnover. As well, it has been found that fibre binds bile acids, hindering their degradation. The lignin portion is especially responsible for this and, it is felt that by its reducing phenolic groups, it is capable of binding free radicals which are also implicated in carcinogenesis.

In an animal study, it was discovered that cyclamate was toxic to those on a low fibre diet but not to those on a high fibre one. By its binding ability, fibre might prevent the transformation of cyclamate to the toxic metabolite cyclohexamine. Another experiment performed on rats illustrates the benefits of a high fibre diet. The rats were divided into groups receiving diets which varied in fibre content. The rats were injec-

ted once a week for 20 weeks with dimethylhydrazine, which is known to induce colonic cancer. A control group was injected with saline. After 28 weeks, the rats were killed and were investigated for colon cancer. No tumours were found in the control animals. In the group with a low fibre diet, 70.6% developed colon cancer, in the intermediate fibre group, 50.0% and in the high fibre, bran diet, 5.9%. This decrease in incidence of colon cancer as dietary fibre is increased speaks favourably for the preventative role of fibre. The group with no fibre intake showed an incidence of 42.1%. This apparently paradoxical finding may be a result of the fact that alimentary secretions are so low in this instance that the bile acid factor is carcinogenesis is effectively removed. The theory that a decrease in fibre intake may be linked to an increased incidence of colonic cancer is supported epidemiologically, often backed up experimentally and appears plausible on the basis of logic.

Cholelithiasis

Some evidence for the prevention of gallstones by fibre has recently emerged. The way in which gallstones are believed to occur is through supersaturation of bile with cholesterol, causing it to precipitate out and form gallstones. Fibre is postulated to be able to prevent this from happening through its effect on the binding of bile acids, and by decreasing transit time, bile acid absorption from the faeces is hindered. As a result bile acid excretion is increased and the bile acid pool is diminished. In an attempt to maintain the bile acid pool constant, cholesterol would be diverted into bile acid synthesis to compensate. This causes a decreased biliary cholesterol, in other words, less possibility of precipitation. In patients with gallstones, 50g/day of bran reduced the cholesterol saturation from a mean of 1.43 (greater than 1 can result in precipitation) to 0.76. These results support the proposal that an increase in fibre intake may prevent gallstones.

Summary

The evidence for the beneficial effects that fibre has on the gastrointestinal system appears convincing. As a result, sales in bran fortified cereals have increased by as much as 20% in one year. If fibre is to be added to the diet, bran is the most efficient and least expensive form. Burkitt recommends 20g of miller's bran a day as a preventative measure. Moderation should be exercised, however. A sudden in-

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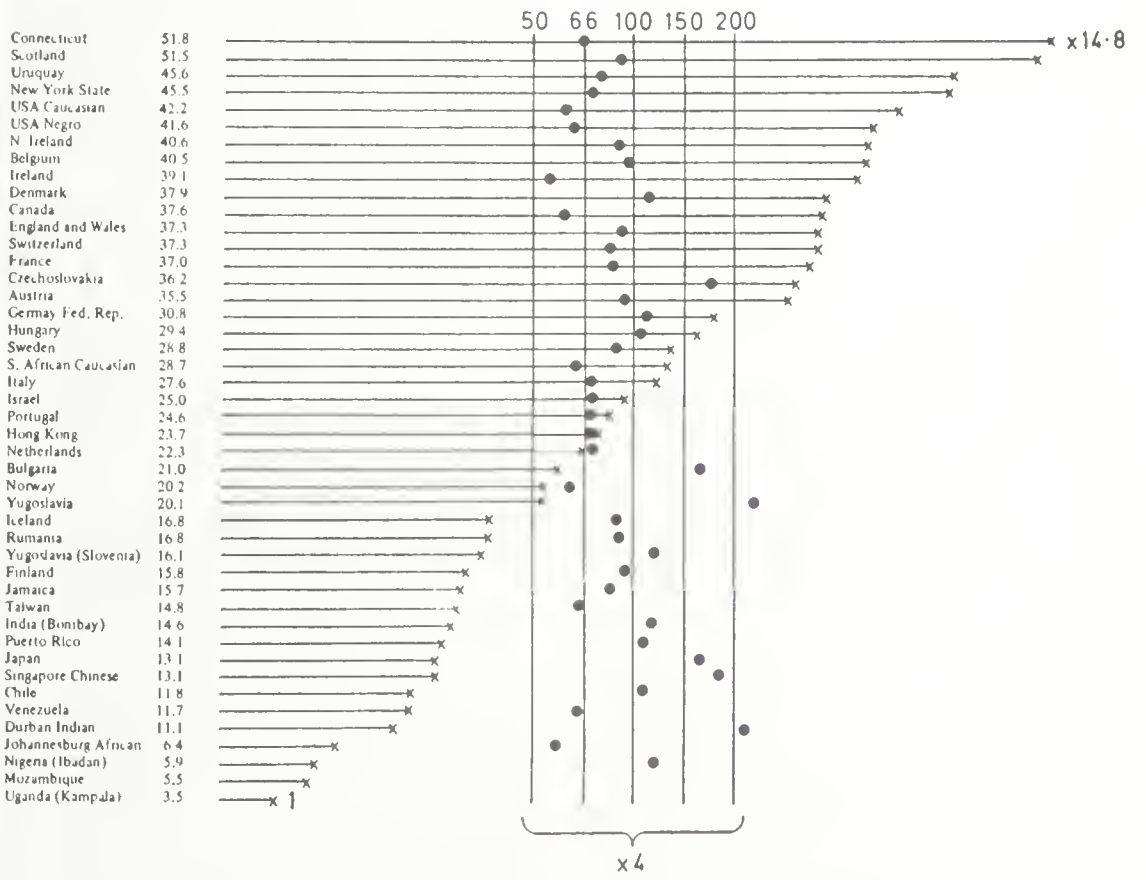

Fig. IV: Age-standardized rates for cancer of the colon and rectum in men 35-64 years of age arranged in order of incidence (modified from Doll, 1969). The variations in the ratio of rectal/colon tumours are shown by black dots on the same scale. 100 = parity. (Reprinted from 'Modern Trends in Oncology". Butterworth, London, 1973.)

Liver Function And Hepatitis B Status In Hemophiliacs

J. Dan Campbell 8T2

Since the mid-1960s the treatment of hemophiliacs with cryoprecipitates and freeze-dried concentrates of plasma has become increasingly common. At the same time, the incidence of both clinical hepatitis and asymptomatic liver function test abnormalities among hemophiliacs has grown. In an assessment of forty-nine hemophiliacs carried out by the South Western Hemophilia Programme in 1979, although none had had clinical hepatitis, thirty were found to have abnormal liver function tests, and abnormal tests were more frequent among individuals with evidence of hepatitis B infection than in those without. The results of the study underline the need for collection of more precise data regarding the transfusion products received by hemophiliacs and their liver function status in order that better transfusion products may be provided and therapy for this condition improved.

Hemophilia is a chronic lifelong disorder requiring, in severely affected individuals, frequent transfusions of blood products containing the missing coagulation factor. Hemophiliacs deficient in factor VIII or factor IX are treated with factor VIII or factor IX-containing concentrates when they hemorrhage spontaneously or as a result of trauma, in preparation for surgical procedures or, in patients with recurring hemorrhages, on a prophylactic basis. Thus, there is an increased risk of infection by blood-borne hepatitis virus in this group of individuals.

Originally, transfusions for hemophilia consisted of either whole blood or plasma, which produced a hypervolemic state in individuals given the quantities required to effect and maintain hemostasis. In 1965 Judith Pool discovered that fresh frozen plasma thawed at 4°C contained a protein precipitate rich in factor VIII. This product, called cryoprecipitate, became widely available in the last half of the 1960s and proved to be effective treatment for factor VIII-deficient hemophiliacs. The early 1970s saw the further development of lyophilized factor VIII and IX concentrates with the following advantages. Firstly, lyophilized concentrate can be stored at 4°C or room temperature, whereas cryoprecipitate must remain below −20°C. Thus, the dried product gave hemophiliacs more freedom to travel, as they did not have to have a source of dry ice to keep material at −20°C. Secondly, since freeze-dried concentrates are easier to infuse, they made home infusion possible for many hemophiliacs. Lastly, lyophilized material can be given with more confidence as the activity of each vial is known, whereas this is not the case for individual units of cryoprecipitate. Nevertheless, the lyophilized concentrates are made from pooled blood donations, and for this reason have been considered to carry an increased risk of infection by hepatitis B, and non-A, non-B viruses.

Abnormal liver function tests in hemophiliacs have been reported in the last four years, and the incidence is alarmingly high, ranging from 45% to 77%. The type and severity of hepatic damage can only be confirmed by invasive liver function tests, which carry some risk for a hemophiliac. Nevertheless, liver biopsies have been safely performed on hemophiliacs with abnormal liver function tests, and have revealed a variety of aggressive and benign lesions.

I was employed as a summer student to work with the South Western Ontario Hemophilia Programme, and one of my duties was the collection of data from the annual assessment of hemophiliacs screened by the Programme. The data obtained from liver function and hepatitis B testing form the subject for this paper.

Patients and Methods

Forty-nine factor VIII and IX-deficient hemophiliacs of varying age and with diseases of varying severity (Table I) were assessed by the South Western Onatario Hemophilia Programme at St. Joseph's Hospital, London, during June of 1979. Under the direction of Dr. Martin J. Inwood, Medical Director of the Programme, I was responsible for such components of the assessment process as the collection of blood samples, urinalysis, and the collection of the laboratory data. Other aspects of the assessment included family, medical and transfusion histories, physical examination (including musculo-skeletal

examination), radiography of all weight-bearing joints, and dental assessment. The laboratory investigations included liver function tests, and detection of HBs Ag (hepatitis B surface antigen) Ab (hepatitis B surface antibody). Serum for the liver function tests was obtained by aspirating a 15 ml whole blood sample into a siliconized vacuum tube, adding 0.1 ml of thrombin, 100 units/ml to accelerate clotting, and centrifuging at 3000 rpm for 20 minutes. Two ml of serum were frozen at -30°C and the SGOT, (serum glutamic oxaloacetic transaminase), GTP (gamma glutamyl transpeptidase) and alkaline phosphatase were determined and protein electrophoresis was performed using standard laboratory procedures. A patient was considered to have an abnormal liver function test (LFT) if either of the first two enzymes were elevated, or if the protein electrophoresis deviated from the hospital limits of normal for that particular population group.

A further 1 ml of serum was frozen and subsequently tested for the presence of HBsAg and HBsAb. Samples were tested for HBsAg using the Ausria II (Abbott) solid-phase radioimmunoassay. This is a sandwich technique in which patients' serum is incubated with HBsAb-coated beads. If HBsAg is present in the serum it will bind to the antibody. After this incubation period, ^{125}Iodine-labelled HBsAb is added and this in turn binds to the antibody coated beads. After washing, the bound iodine will be detectable, thereby indicating if HBsAg is present in the patient's serum.

Table I: Age Distribution as Related to Clinical Severity

	Mild	Moderate	Severe	Total
16 and under	2	5	15	22
Over 16	2	6	19	27

Results

Of the forty-nine hemophiliacs three were found to be HBsAg-positive, and another three had changed antibody status from HBsAb-negative in 1978 to HBsAb positive in 1979, Table II. Thus, there were six patients with presumed exposure to hepatitis B antigen, giving an incidence of 12.2%. None of these individuals demonstrated any clinical signs or symptoms of hepatitis. Four of the six had abnormal liver function tests; three had received lyophilized factor VIII within the last nine months for the first time, although they had also received cryoprecipitate during the same period.

The incidence of HBsAb in this population of hemophiliacs, excluding the newly infected individuals, was 86% (37/43). The liver function tests of 60.5% (26/43) of the same population were abnormal. Hepatitis antibody status and liver function data are shown in Table III. The proportion of all HBsAb positive individuals with a liver function test abnormality was 67.6% (25/37). Fourteen of the twenty-five hepatitis B antibody-positive individuals (66.7%) had LFT abnormalities in 1978 as well as in 1979. Similar abnormalities were present in only one of the six (16.7%) HBsAb-negative individuals.

Discussion

Eighty-six per cent of the hemophiliacs assessed were HBsAb-positive, indicating previous exposure to the hepatitis B virus. The incidence of clinical hepatitis in such individuals is considered to be approximately 17%. Although this fraction is small compared to the number of people exposed, it is

Table II: Laboratory Data on 6 Hepatitis Type B-Infected Hemophiliacs
* upper limit of normal = 36 i.u.
° upper limit of normal = 24 i.u.
A = Abnormal N = Normal

Patient	Age	-GTT* (1979)	SGOT° (1979)	Electro-phoresis (1979)	HBsAb 78	HBsAb 79	HBsAg 78	HBsAg 79	Lyophilized Factor VIII in last yr.	Cryo. in last yr.
1	11	46	491	N	−	−	−	+	No	Yes
2	6	7	22	A	−	−	−	+	Yes	Yes
3	6	22	80	N	+	−	−	+	Yes	Yes
4	16	11	23	N	−	+	−	−	No	Yes
5	62	114	42	A	−	+	−	−	Yes	Yes
5	6	7	18	N	−	+	−	−	No	Yes

much higher than values reported in the early 1970s. This increase in clinical hepatitis may be due to the use of factor concentrates that began in the early 1970s. The proportion who had become hepatitis B antigen-positive since the previous assessment while remaining clinically asymptomatic was 12.2%, which compares favourably with other reports. This figure includes those who had changed antibody status, indicating recent infection. These hemophiliacs can only be considered infected if one assumes that they truly lacked HBsAb in 1978, and it was not present in amounts too small to be detected by RIA. Thus, the incidence of infection may have been as low as 6.1%

The six infected individuals showed varying degrees of liver function test abnormalities ranging from completely normal (patients 4 and 6) to very abnormal (patients 1 and 5). Only patient 5 had a history of previous clinical hepatitis, and all cases were asymptomatic at the time of examination. Three patients (4, 5, and 6) changed antibody status, indicating infection with hepatitis B, but did not have any detectable antigen in their serum. This could be explained by the lack of sensitivity of the radioimmunoassay for hepatitis B. In a study by Barker et al., chimpanzees were infected with hepatitis B-positive serum that had been diluted to 10^{-7}, and subsequently performed hepatitis B-antigen tests gave negative results. This suggests that plasma negative for HBsAg by RIA can still be infectious. All blood donations taken in Canada have been screened for HBsAg by RIA since July 1972, and it has been shown that this has decreased the number of antigen-positive batches of concentrate. However, with the current sensitivity of the RIA antigen procedure, it must be assumed that there will be infectious batches of both lyophilized concentrate and cryoprecipitate. Concentrates must be considered the higher risk product as they are usually made from plasma pooled from over 5,000 donations. The present study could not demonstrate that the use of lyophilized factor concentrates results in a higher infection rate than does the use of cryoprecipitate, as the hemophiliacs were receiving both products between their annual assessment examinations and no liver function tests or hepatitis B tests were performed between these two annual examinations.

Another problem with hepatitis screening is the potential existence of a third type of virus, which causes non-A, non-B hepatitis. One author estimates this hepatitis to constitute 89% of all cases of clinical hepatitis.

Young hemophiliacs under the age of six years are the ones at greatest risk of hepatitis, as they have not yet acquired an antibody (antibodies) believed to be protective against the virus or viruses. In this study, five of the six infected individuals were under 16 years of age. Mannucci et al found that nine of eleven hemophiliacs with liver pathology demonstrable on biopsy were under the age of 18. It is interesting to note that antigen was found in the serum of patient 3 despite the presence of the protective

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Table III: Abnormal Liver Function Tests (LFT) and HBsAb Status in 43 Hemophiliacs

	Abnormal LFT	Normal LFT	Total
HBsAb positive	25	12	37
HBsAb negative	1	5	6
Total	26	17	43

antibody nine months previously. The reason for this anomalous result is not known at this time, although a number of speculations could be made.

The proportion of hemophiliacs which abnormal liver function tests (LFT), in hemophiliacs has been reported to be between 45% and 55%. Of the patients in this study, 60-5% showed LFT abnormalities and two thirds of these had had an abnormal LFT in their last annual assessment. Biochemical findings, however, cannot differentiate between a benign lesion such as chronic persistent hepatitis (CPH), and more severe hepatic disease such as chronic aggressive hepatitis (CAH). Specific information on the type of hepatitis can only be obtained by liver biopsy, a procedure of some risk for a hemophiliac. Several investigators have performed biopsies on both symptomatic and asymptomatic hemophiliacs with abnormal liver functions tests. Appropriate factor replacement was given before and after the biopsy. Chronic active hepatitis can progress to cirrhosis, and would require the clinician to consider alternative forms of therapy for the affected hemophiliac.

It is interesting to note that 67.6% of HBsAb-positive individuals had an abnormal LFT, while only 16.7% of the HBsAb-negative group had an abnormal test. These results would indicate that continued antigenic stimulation not only maintains antibody levels but is related to the abnormal liver function tests. The antibody would then be providing protection against acute disease and clinical symptoms, as well as possibly masking any antigen present by forming immune complexes.

Although abnormal liver function tests in hemophiliacs must be of major concern to the physician, maintaining adequate hemostasis must remain the primary goal in treating hemophiliacs. Development of more sensitive tests for HBsAg and the non-A, non-B hepatitis viruses will provide 'cleaner' blood products for hemophiliacs. The South Western Ontario Hemophiliac programme is using a diary and blood bank monitoring process which will, it is hoped, hepatitis provide more information relating transfusion products to change in hepatitis B status. Such a monitoring process would appear to be necessary for this group of individuals.

The evolution of non-invasion methods to distinguish between benign and aggressive forms of liver disease will enable physicians to improved their therapeutic approach for multi-transfused hemophiliacs

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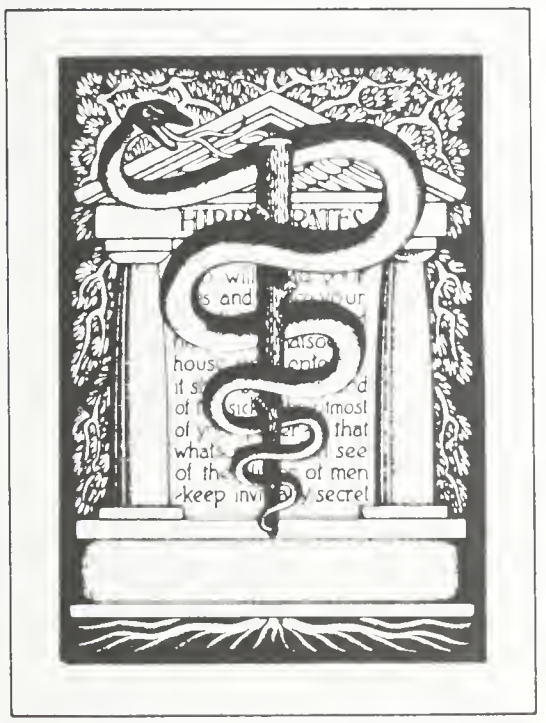

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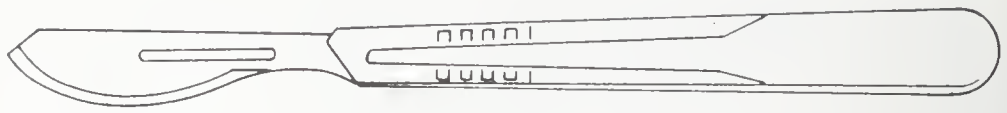

The Right To Choose To Die

Pro:

To end intolerable mental and/or physical pain, or to preserve the dignity of one's life, suicide is a logical consideration.

My beliefs about the right of an individual to end his life are based on observations (in a hospital setting) of human suffering, inflicted indignities, and their consequences; prolonged consideration of the concept of suicide and its implications; as well as limited experience as a health care professional in intervention with people in crisis.

I intend to discuss the right to end one's own life on a rudimentary level, uninfluenced by cultural and religious beliefs. Of course, this is not to dismiss the extreme importance of these two variables for the individual; rather, I simply acknowledge the fact that different cultures and religions dictate varying laws regarding suicide and thus, may influence the individual's final decision and actions.

I believe that people commit suicide because of pain—mental and/or physical; a depth of pain or mental anguish which is impossible to accurately qualify or quantify. Complete and true understanding of this pain cannot be achieved except through actual experience.

I accept suicide as an appropriate alternative to life only under certain circumstances. The decision should be made in the presence of the following:

1) the individual is "sane"; that is, the mind is unaffected by psychiatric illness or other mental deviation. It should be noted that some people will argue that the act of suicide itself demonstrates underlying mental disturbance

2) the decision is reached logically; that is, alternatives have been carefully weighed; the actual act and its implications have been thoroughly considered; it is not an impulsive act.

3) the suicidal motivation (although difficult for an observer to assess) is the termination of one's pain and suffering, or it is to maintain or regain some aspect of human dignity in death. The death is not to inflict revenge on significant others or society.

The following examples illustrate situations in which I can see suicide as a logical alternative:

1) quadriplegia, paraplegia, severe burns—especially note the effect of quadriplegia on the life of a sculptor or pianist

Con:

It was two o'clock in the morning in the middle of a cold February night when Mary, a clinical clerk, was called to see a drunk in emergency at St. Michael's. Needless to say Mary was not happy to be getting up again that night, especially after having worked all day, but her annoyance turned to anger when she realized that the drunk she was now looking at was the same man who had tried to cut his wrists two evenings ago; and he had done it again tonight. The fresh lacerations required twelve sutures with four 'C' silk and as she put the bandages on she told him, in disgust, to get it right next time and jump into Lake Ontario from the Island Ferry...at least he would stop bothering her. Mary saw the man again that night, 5 hours later; this time blue, wet, half-frozen and dead. He had drowned himself in Lake Ontario. Mary cried.

For fear of being accused of dramatics, rest assured that the above event actually occurred to a clinical clerk one night, in a Toronto teaching hospital, not long ago. This story brings to life the problem of suicide in our society.

The question of suicide is fraught with misconceptions which are held by the general public but which the physician must not let himself be led by, for if he or she is an average doctor, he will encounter six or more potential suicides in office practice every year. How severe is the problem? Suicide accounts for 10% of the deaths between the ages of 25 and 34 and for 1/3 of deaths among university students. It is, needless to say, an epidemic; an epidemic feeding on the misunderstandings of those who condone the individual's prerogative to kill himself.

Those who wish to allow suicide claim that the taking of one's life is an individual's right, that a person must be free to do with his body what he chooses. However, herein lies the flaw in their arguement, for these individuals fail to understand that the person who commits suicide is not acting of his own free will, but rather is being coerced by his psychological illness. It must be realized that clinical depression accounts for well over half of all attempted suicides and that this psychological illness is the force responsible for their actions. The depressed patient is

Pro (continued)

2) "stroke" resulting in expressive dysphasia/aphasia—the so-called "locked-in" syndromes; similarly, cerebral palsy
3) in certain cases of terminal cancer, e.g., when all known treatment has failed and the morphine is losing its effectiveness against bone pain so severe that even the thought of movement is an excruciating experience
4) instances of chronic depression where despondency and hopelessness never resolve
5) situational loss of self-esteem—perhaps economic failure, social scandal, etc.

The above are examples which come quickly to mind; no doubt they are those situations which I would find untenable. Quite different situations may disturb you. It is important to note that probably the majority of people caught in the above situations do adapt and live worthwhile lives without ever seriously considering suicide. These people have, or are able to create, a psychological strength that enables them to live with adversity. Until we are placed in such situations it is impossible to predict our own reactions. However, because I understand the other side, I could never condemn, ridicule or pity a person who opts out of a painful life.

How will these beliefs affect my future medical practice? Will I put these people on a figurative mountain in Greece, to live or die as their internal resources allow? Absolutely not. All supportive and therapeutical care should be given. But if after all that can be has been done, and the patient can tolerate no further pain, then his right to end his own life—i.e., his right to cease unbearable mental and/or physical pain, or his right to live with dignity through death—should be respected. This does **not** mean that a doctor actively promotes or aids such a decision; it simply means that he does not promote patient suffering actively, needlessly, or inhumanely.

Are there situations in which the right to end one's life should be suspended? At the risk of sounding omnipotent,

(continued on page 63)

Con (continued)

overwhelmed with feelings of hopelessness, anger and personal devaluation. However, we are now learning that this devastating clinical illness is quite genuine and almost completely curable. Most depressed patients, even those who are deeply depressed, when properly treated, return to their normal personalities within a period of weeks. But if left untreated the feelings of self-reproach may become so overwhelming that, for many, suicide is the only recourse left.

Since depression accounts for most instances of suicide, then failure to intervene in a suicide attempt is analogous to letting a heart attack patient die if he can't walk to your office. By stopping and treating the suicide victim we are not denying his liberty but rather we return to him the freedom which his illness had stolen. Proof of this is evident in the fact that the depressed individuals who attempt suicide and are treated, are later grateful for having failed in their attempt and only too happy to return to normal life. Those people, however, who are not fortunate enough to find someone who understands the attempted suicide's cry for help, and thus remain untreated, usually go on to be successful in the taking of their own life. In fact, one out of every ten attempted suicide victims tries again and does the job right. The suicidal individual is ambivalent about the taking of his own life and well over one half of those who kill themselves have been to a physician in the two months preceeding their deaths. The mistake on our part as doctors is in the failure to recognize the plea for help and the error in not treating them properly.

Those who condone suicide as an individual's prerogative always mention the dying patient who is in real physical pain and his right to end his life. However, these people represent the minority of those who kill themselves. Suicide is the leading cause of death in the young, the well-off, the intelligent and using the old or infirm as the yard-stick to measure our acceptance of suicide is a gross misrepresentation of the problem. One

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Nakht: Autopsy Of A 3000 Year Old Mummy

Robert Hegele 8T1

In light of the recent Tutmania and Ancient Egypt fever, it seems appropriate to write about Toronto's own celebrity from the land of the pyramids. It is especially appropriate for this journal because of the medical overtones of his story. His name is Nakht and he was unearthed in 1904 by an archeologist from the Royal Ontario Museum on an expedition in Eastern Egypt. Nakht was ROM property until a few years ago, when he became a permanent resident of the Academy of Medicine Museum on Bloor Street. From 1974 to 1976, Nakht was the object of a unique medical and scientific study involving over 50 specialists from Toronto (mainly), Detroit, Philadelphia and Cardiff, Wales. Doctors, dentists life scientists as well as paleopathologists, archeologists and other academic people subjected Nakht to an extensive and intensive examination. Their collective report was published in the Canadian Medical Association Journal in 1977.

Nakht was not a king or pharaoh or, indeed, any type of nobility. His wooden coffin bore the hieroglyphics: "deceased weaver of the funerary chapel of King User-Har-re." This king, Nakht's master, ruled 3200 years ago in the Twentieth Egyptian Dynasty, about 100 years after Tut. Nakht was a weaver from Thebes (a city in ancient Egypt). Being from the lower social class, his family could not afford an expensive funeral. The usual well-known mummification process involved evisceration and saturating the remaining shell of the body with sacred oils before wrapping it with oiled linen. The embalming process was believed to preserve the body, allowing for a smooth transition into the after-life. The nobility were buried in tombs with their worldly possessions, for "future use." Because of his low standing in society, Nakht was simply wrapped in plain linen and buried in a coffin. The dry, stable Egyptian climate allowed the body to dessicate naturally and it was preserved virtually intact.

The first stage of the multidisciplinary investigation was to radiologically examine Nahkt to determine the potential usefulness of carrying out such a large project. On X-ray, he was determined to be between 14 and 18 when he died (by looking at hip and knee epiphyses). He was also noted to have "buck teeth." The internal organs appeared to be present, so the investigation proceeded in a stepwise manner.

Gross Anatomy

Nakht was 143 cm. long and his remains weighed slightly more than 5 kg. The skin was tough and leathery and his fingerprints were preserved. There was no evidence of dental cavities. CAT scan of the brain showed that the grey and white matter were preserved and the lateral ventricles were intact. The spleen was found to be enlarged and possibly ruptured.

Otolaryngology

Ear diseases and hearing loss were very common in Nakht's time. He escaped any damage to his ears and his hearing was probably unimpaired.

Histology

Lungs: Anthracotic pigment was noted in the connective tissue. This was environmental, probably from inhalation around fires or lamps. Pulmonary silicosis due to inhalation of dust or sand was apparent in both lungs. This could have been due to working near a stone quarry or workshop.

Intestines: Within the lumen were found dessicated ova of the Tenia Solium or Saginatum species. Also, there was strong evidence of Schistosoma Hematobium and Mansoni.

Liver: An early pattern of cirrhosis was obvious and was assumed to be secondary to hepatic schistosomiasis.

Myocardium, Coronary Arteries, Aortic Valve: No appreciable disease detected.

Urinary Bladder: Well preserved erythrocytes on bladder mucosa were suggestive of hematuria.

Intercostal Muscles: Cyst-like structures were observed, suggesting cysticercosis or trichinosis. On closer examination, the cysts were found to be Trichinella Spiralis.

Protein Analysis

Analysis of gammaglobulins and myoglobin was generally non-specific. A test for neutral lipids from the diet was inconclusive.

Blood Group Test

From Nakht, investigators obtained what are believed to be the oldest surviving erythrocytes from any human. These were taken from the sigmoid sinus. Using the serologic micromethod technique and the inhibition agglutination test, researchers determined that Nakht had type B blood.

The provisional causes of death were malnutrition and complications from the parasitic infections. While Egyptians were supposedly strict vegetarians, the tapeworm ova in the gut along with the strong eveidence of schistosomiasis and trichinosis indicate that Nakht probably ate raw, uncooked meat (pork) at some time. The fact that he worked at the funerary chapel raises the suspicion that he had access to sacrificial meat and that he may have pilfered some and ate it raw or undercooked.

Interestingly, schistosomiasis has remained to this day a major chronic debilitating disease in that region of the world, indication that over the passing of 3000 years little host-parasite adaptation has developed.

Nakht was an excellent choice for an autopsy. He was probably more representative of the ancient Egyptian population than most of the mummies which have survived to this day because of his nonaristocratic working class background. Of the period in Egyptian history during which he lived, much is known from the written records. It was an era of inflation, political confusion along with moral and spiritual unrest. The remains of Nakht have given scientists today a glimpse of the past from a different perspective: a human one. As well as providing insight into the way one person of this period possibly lived and probably died, this unique scientific project showed us something of ourselves: that essentially humans have not changed over the millenia. While the context may be altered, ultimately the pursuit of health in life and our susceptibility to disease and mortality remains constant. □

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Reference

1) *CMAJ*, Vol. 117, Sept. 3/77, pp. 461-476, many contributors.

Many thanks to Mr. John Senior, Curator of the Academy of Medicine Museum.

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CAN CANCER BE BEATEN? YOU BET YOUR LIFE IT CAN?

Summer Scholarships

Jenny Simpson 8T1
Harold Pupko 8T3
Les Urbankiewicz 8T1

All first and second year medical students are eligible for the summer scholarships. Booklets were issued in December listing faculty members and physicians who are prepared to supervise a student during the summer. Students are encouraged to seek supervisors in any area of medicine and are by no means limited to suggestions in the booklet. The student and the prospective supervisor both complete the application form and each project is then ranked by the members of the Committee.
Last year, 160 applications were reviewed for 95 positions. (33 research and 62 clinical). Of the 160 applications received, 92 applications were for clinical work and 68 for research. In first year, 24 applications were for clinical positions and 37 for research. In second year 66 applications were for clinical/family practice positions and 31 for research. Two research positions were also received from the Art as Applied to Medicine Department.
The basis for choosing applications for positions are: their objectives and relevance to their educational experience and career expectations, past experience (e.g. electives and/or other), supervisor's enthusiasm towards the student, etc.

M.A.A. Summer Scholarships

The Medical Alumni Association, composed of graduates from the Faculty of Medicine of the University of Toronto, sponsored seventeen summer student scholarships in 1979. The scholarship program is only one of many programs supported by the M.A.A. in its goal of promoting undergraduate education. The M.A.A. also provides funds for loans, bursaries and scholarships; a transportation fund provides up to $150 for travel expenses to electives and summer scholarships; an education fund is available which assists fee payment for special seminars of courses related to medicine.

To illustrate the diversity of interests supported by the scholarship program, five students' experiences and programs will be described.

Hugh Scarth 8T2 worked in the Respirology Service of St. Joseph's Hospital, Toronto, under the supervision of Dr. E.S. Lilker and Dr. C.H. Rodriguez. His program included exposure to clinical respirology (daily ward and ICU rounds, out-patient chest clinics and attendance at 35-40 bronchoscopies), a literature review and a research project. Hugh helped develop a protocol for the assessment of a telescoping Teflon cannula which, from literature review, was found to be the most effective and minimally invasive means of acquiring a lower respiratory tract specimen relatively free from upper tract contamination. The Teflon cannula employs a gelfoam or polyethylene glycol plug which prevents a brush, located in the cannula, from becoming contaminated until the brush is extended at the desired site.

A review of approximately two hundred charts was undertaken to evaluate whether results from the culture of expectorated sputum for bacteria made a positive contribution to the treatment of pulmonary disease. Hugh states that "many interesting trends were apparent;" however, at summer's end statistical analysis of the data had yet to be completed. The M.A.A. scholarship program allowed Hugh to have "a *most worthwile and enjoyable summer. I feel I came away with quite a good understanding of pulmonary disease, its diagnosis and its treatment.*"

Sparrow Rabideau 8T2 continued prior research interests at the McMaster University Medical Centre under the supervision of Dr. E. E. Daniel and Dr. R. E. Garfield. Sparrow's research investigations stemmed from previous studies on the mechanisms of partruition. She writes, "*the initial observation which set this project into motion was the appearance of gap junctions between rat myometrial cells only at the time of labour and delivery. Gap junctions, a type of intercellular contact which are thought to provide low-resistance pathways to current flow, were not found at any other time during gestation, and their appearance at term coincided with the rapid fall in plasma progesterone which is characteristic of this species. By improving electrical coupling between cells, gap junctions may facilitate the generation of synchronous uterine contractions for the*

successful expulsion of the fetus (es). Using quantitative electron microscopy, this phenomenon of gap junction formation during the periparturient period was subsequently observed in guinea pigs, sheep, and women undergoing cesarean section after spontaneously entering labour. Hence, a common denominator has been found in these species at the morphological level, in contrast to the relative lack of success of endocrine studies aimed at finding a common hormonal event. This summer in collaboration with Dr. J. R. G. Challis of the University of Western Ontario, the possible factors governing the formation of gap junctions in pregnant sheep were investigated... The question we sought to answer was whether the formation of gap junctions is directly attributable to the endocrine changes or whether it is secondarily due to the increased concentration of prostaglandins in the myometrial tissue.

... Another project which was started this summer was designed to provide evidence that the presence of gap junctions in myometria does indeed change the electrical properties of the tissue, specifically the propagation speed of action potentials." Interpretation and analysis of Sparrow's very interesting research has not yet been completed.

Working in a family practice clinic in downtown Toronto, under the guidance of Dr. Klinghoffer, represented Pomilla Chhabra's (8T2) first exposure to clinical medicine. She practiced history taking, physical examination of the adult and child, administration of allergy shots, taking blood pressures, venipunctures and pre- and post-natal care routines. In general, Pomilla enjoyed exposure to the diverse and special opportunities which a family practice offers. The critical importance of interpersonal relationships and the concept of the patient as a unique being were developed and Pomilla enthusiastically states that *"a person has a disease — with the emphasis being on the person and not the disease."*

During the past summer, Evelyn Tai 8T1 worked with Dr. Collins-Williams in the Department of Allergy at the Hospital for Sick Children. Evelyn started her twelve week program with *"...nine teaching sessions which were very helpful to me for background in paediatric allergy. After gaining some knowledge in this area of medicine, we began to see patients. From Dr. Collins-Williams, skills of taking a history and doing a physical examination on the paediatric group of patients (were) acquired. Clinical presentations of patients with allergies such as asthma, atopic dermatitis, food allergies and hay fever etc. were seen and I would be confident to make the diagnosis and treat the patient appropriately in the future.*

Besides the clinical aspects, laboratory techniques, such as skin testing and nasal smear preparations etc., were learned. We were continuously reinforced by having further teaching sessions and reading a lot of literature. There were little projects assigned entirely for teaching purposes. They were studies on Allergies to Aspirin, Penicillin Sensitivity and Viral Illness and its long term effects on lungs."

Completing Evelyn's *"very useful summer"* was attendance at "rounds" and at seminars.

Justin Lee 8T1 spent his summer as a member of the Toronto Antenatal Genetic Clinic — a multidisciplinary clinic which incorporates the services of obstetrics-gynecology, genetic counselling, ultrasonography, and cytogenetic and biochemical laboratories. An appreciation of patient attitudes and the clinical aspects of antenatal diagnosis was gained through his participation in counselling and in the diagnostic procedures. After extensive reading in the area of genetic amniocentesis and its implications, Justin initiated a study; through chart review, he investigated two hundred consecutive patients with respect to the efficiency of genetic amniocentesis. The results of this study are to be presented to the antenatal diagnosis group, and a report has been submitted for publication to the C.M.A.J.

Justin describes the summer scholarship as being *"an extremely worthwhile experience. It not only provides an excellent learning experience from an academic perspective but also from the practical perspective; the blending of academic knowledge with clinical practice, the administrative details and person-to-person relationships between patient and physician and between physician and physician. Such welcomed exposure 're-fascinates' one to our profession as it makes one feel truly a part of it."*

The benefits of the summer scholarship program are multiple and well illustrated by the projects of the above students. Recognition must be given to the Medical Alumni Association for their support of this program□

J.S. 8T1

M.R.C. Summer Scholarships

In the summer of 1979, the Medical Research Council of Canada provided funds which enabled 12 UofT medical students to undertake research projects in a variety of fields in medicine. The program allowed students from various backgrounds to participate in projects ranging from scientific investigation in the laboratory to surveying the medical literature. The projects provided valuable experience for the students, regardless of whether or not they had concrete results to present for their efforts.

Martin Chepesiuk, 8T1, describes why someone who is essentially divorced from full-time research might actually be motivated into trying it for a summer:
"What prompts a person to give up a secure job and enter the challenging but financially risky world of scientific research? This past summer was the second time I have taken on a summer scholarship, trying to answer for myself the question of which path my life will take. One of my ideals has always been to become a researcher, a person dedicated to sweeping away the mists of man's ignorance. To me the cloudiest and most challenging area of science today is the study of the mind, so I regretfully put aside plans for a European vacation in order to work with some prominent researcher in this field."

Martin investigated the effect of alcohol on post-tetanic potentiation (a form of learning) using a rat hippocampus slice preparation. He worked for Dr. H. Kalant, professor of pharmacology at U. of T., and Dr. W. Corrigall of the Addiction Research Foundation. Although no definite conclusions could be reached due to time limitations, the time spent working on this research proved to be of great worth. Martin reflected on his summer's work: *"These experiences in research have shown me the dedicated and painstaking work needed to unearth each morsel of knowledge, so even if I do not pursue my plan to get involved in clinical or basic medical research, I have at least gained some insight into the difficulty and importance of medical research."*

Other students met with more specific success in their laboratory research. The scholarship Sol Stern, 8T2, received enabled him to continue research he had done while obtaining a Master's in Biochemistry. His work over the summer involved isolating and further characterizing Serum Amyloid P-component (SAP). This protein is found in the sera, but not the tissues of normal individuals. However, in people with the disease amyloidosis, SAP is found in both the serum and tissues. The presence of this protein in all forms of amyloid deposits may provide clues regarding the pathogenesis of the deposits and the disease. During the summer, Sol derived a method of isolating SAP in significantly less time than previous methods. As well, some new questions about the characteristics of SAP at low pH were raised.

Nasser Velshi, 8T2, spent his summer doing research in immunology, studying the characteristics of lymphocyte membrane proteins, under the direction of Dr. B. H. Barber. New facts and evidence emerging from this field of research are having a tremendous impact on important medical issues such as transplantation rejections and the wide variety of immune responses between and among different individuals. Specifically, his work dealt with the application of bifunctional chemical cross-linking reagent to the study of membrane proteins. He was able to successfully establish the workability of one of the cross-linkers, and his results have opened up the possibility of applying this useful tool to study the nature of the various membrane components and eventually the membrane as a whole.

In a somewhat different vein of research, Anne Summers, 8T2, worked on enlarging and updating the teratogen file of the Department of Genetics of the Hospital for Sick Children. The file was to consist of a collection of the most recent papers available on each teratogenic agent and based on this work a book on the teratogens, containing as summary of each agent was started. Dr. Noreen Rudd, Anne's supervisor for this project, was interested in having this information not just for the Department of Genetics but also for any physician in a position to advise pregnant women on teratogen risk during pregnancy. Anne (modestly) summarized her work: *"I managed to cover about a hundred teratogens but unfortunately this barely dents the surface. However, the system is set up so that it can be constantly updated and added to. I tried to cover most of the major teratogens including alcohol, anticonvulsants, estrogens and progestagens, radiation, Cytomegalovirus, Rubella, Toxoplasma and lithium."*

Medical research is not everyone's beaker of caffeine (or cup of tea, for that matter). But medical research is an exciting and essential area of medicine. Today's discovery may become tomorrow's cure and the next day's subject matter for examinations. The Medical Research Council of Canada has a commitment to improving the current status of medical research of this country, and one way is providing funds for first and second year students to do summer projects such as those described above in the hope of enticing a few capable people into a research career. If you are at all interested, you should apply. No one (yet) has said that such a project was not valuable or interesting. And there are plenty of projects to choose from.□

H.P. 8T1

P.S.I. Summer Scholarships

Of the 62 clinical summer scholarships awarded in 1979, 51 were funded by the PSI Foundation. The Foundation makes these funds available in order to encourage summer employment in a clinical setting. Students thus gain early clinical experience at a time when the emphasis is on acquiring mainly factual knowledge in a classroom atmosphere. Also, students become aware of the existence of the PSI Foundation which has funds available if needed for support of specialized post-graduate training.

The following is a sampling of activities which students pursued last summer.

Mike Manjos, class of 8T1, learned a great deal about family practice by working with Dr. G. H. Smith in Jordan Station, a village a few miles from St. Catherines. Mike accompanied Dr. Smith throughout his daily schedule, which included hospital visits, emergency department duty, office visits and surgery, where he assisted in a number of operations. In this way, Mike could follow a patient's progress through all phases of an illness. House calls to geriatric patients and visits to chronic care institutions were also a large part of the practice. In his own words, *"It was there that I realized how important it was for some people to remain at home in their own environment for emotional and psychological well-being rather than being placed in an institution where all individualism and sense of independence is lost."*

Medical students are so extensively trained in the treatment of the sick, that they sometimes are baffled when confronted by the norm. Tracy Burgess 8T2, took a big step in the other direction by working in the pediatric practice of Dr. M. Ghobrial in Ottawa. Tracy says: *"I learned about general immunization schedules and feeding routines in well-baby care sessions. An important part of my summer was the observation of doctor-patient and doctor-parent relationships which are essential components of a pediatric practice."* Tracy did however also see a lot of pediatric pathology at the Children's Hospital of Eastern Ontario. She found surgery, neurology and hematology/oncology particularly interesting, adding that if she had it to do again, she would spend her time at a hospital to increase the variation in problems seen.

Students leave first year with essentially no training in clinical methods, but Luigi Castagna 8T2 took the challenge of a clinical scholarship *"mainly to regain some perspective and sense of direction in dealing with the enormous amount of new knowledge acquired during first year."* Luigi worked with Dr. Barry Gayle in the field of internal medicine. His progress was rapid, doing physical exams by his third day, giving injections and completing charts by the third week and later, doing allergy and pulmonary function testing and assisting in hypnotherapy. However, the most valuable lesson to Luigi was that conscientiousness, honesty and dedication are essential prerequisities for a good physician, just as much as clinical competence.

Second year marks the beginning of clinical teaching, focusing on the cardiopulmonary unit. Paul Ho-Tai 8T1, undertook a summer position which used his newly-acquired knowledge and allowed him to apply it to clinical situations, working with the chest service at St. Joseph's Hospital. Among other duties, Paul took histories, performed physicals and wrote the orders for most elective admissions. He states, *"By daily follow-up of the patients I attained a better understanding of the natural history of many diseases and the efficacy of various therapeutic modalities. In addition, the constant contact with these patients allowed me to improve my skills in communicating with them."*

Another student who worked at St. Joseph's was David York 8T1. Dave got a jump on third year topics by working with three services: Hematology, Gastroenterology and Nephrology/Rheumatology. During his three months, he became proficient in the methods of bone marrow aspiration and biopsy, arterial puncture and starting of IV lines which are usually not learned until fourth year. He also observed or assisted with many other diagnostic methods, such as endoscopy and thoracentesis.
"The Summer Scholarship has enabled me to enhance my practical and academic knowledge. As well, it has increased my level of confidence in my abilities and my awareness of my limitations."

Clinical research and medicine made for an enjoyable summer scholarship for Les Urbankiewicz 8T1. Les worked at Sunnybrook Medical Centre under the direction of Dr. A. Knight, a specialist in internal medicine and clinical immunology. Much of his activity was centered on the General Medical service where patients with both rare and common illnesses were seen. Othertimes he would be in Dr. Knight's outpatient office where people with asthma, allergy and other immunologic problems were examined and investigated. The rest of his time was devoted to measuring pulmonary function in patients treated with two bronchodilators to determine whether there was any difference between them. *"My clinical research duties were an interesting diversion from ward activities. They stimulated my interest in clinical research as a possible future activity and increased my appreciation of the time and work spent in bringing a new and possibly useful drug onto the market."*

In medicine, there are probably few situations more emotionally charged than when one is confronted with a child dying from cancer. Kim Plaxton 8T2 spent her summer working with Dr. L. L. de Veber, a Pediatric, Hematologist and Oncologist in War Memorial Children's Hospital in London, Ontario. As part of the team, Kim observed the initial clinical evaluation, diagnostic investigations and later the different cancer therapies. *"Two of our patients died during the summer: one had congenital leukemia and the other had Acute Lymphoblastic Leukemia; several children were newly diagnosed with A.L.L., Wilm's Tumour, Rhabhomyosarcoma. One becomes immediately aware of the many great stresses brought to bear upon our patients and families; however, you come to realize that despite their situation, most people are able to cope quite well."* Kim's experience extended to other hematologic disorders, including hemophilia and Rh incompatibility where she received practical experience in blood work and even ran the Rh lab for two weeks!

Several students received scholarships to work in the field of psychiatry. Among them was Christine Grabenstetter 8T2 who was part of the "S.C.O.R.E." program at the Clarke Institute of Psychiatry. S.C.O.R.E. (Simultaneous Communication through Operant Regulation and Education) is a program which helps autistic children to begin to communicate and uses a system of sign together with speech. Christine worked mainly with a child who had never spoken a word in his entire five years. *"The child I worked with showed substantial improvement over the five weeks. At the start of the program he used only one sign - "milk" - spontaneously, and had loud temper tantrums whenever he was frustrated or annoyed. At the end of the program he was using five signs spontaneously (which represents a 400% increase in his effective vocabulary!) and tantrummed much less frequently. Most of the other children made similar gains, and we felt very pleased and proud that the methods we were using really had helped these children to communicate better."*

Elliott Weiss 8T2 spent an interesting summer at the Hospital for Sick Children. He functioned mainly as an observer in the Child Psychiatry Department, during which he saw a wide range of psychiatric disturbances. *"I became involved with the craniofacial team where children with facial malformations are surgically treated. There are very serious implications for patients of all ages who have corrective surgery done on their faces and I was fascinated both with this and the surgical procedure."* Elliott also did a research project in which he investigated the effectiveness of the intake service in the Department.

The scholarship program also allowed aspiring surgeons to spend a summer in this specialty. Brian McIntyre 8T2 was introduced to surgery at the Toronto Doctors' Hospital under the direction of Dr. E. Sternthal. A typical day might begin with rounds, during which patients' problems would be evaluated. *"After rounds, if need be, we would proceed to the O.R. where I would act mainly in the capacity of second assistant. This allowed myself the opportunity to learn and become comfortable with the techniques of scrubbing, aseptic gowning, and operating room protocol. At the conclusion of the operation I was often permitted to aid in the suturing of the skin. Through this I was able to become somewhat familiar with the different types and guages of suture material and the art of stitchcraft."*

Michael Stechison 8T1 worked on the general surgery service in the Wellesley Hospital as part of the team under Dr. C. Jamieson. Michael admitted patients to the service and assisted in the operating room. *"In addition to my practical experience in the operating room, I frequently took part in gastroscopic and colonoscopic examinations, as well as performing sigmoidoscopies. I was thus able to visualize some wonderful examples of gastrointestinal pathology."* As a sideline, Michael researched the topic of colon perforation in patients on steroid therapy for submission as a publication.

These are only some of the areas in which students received PSI Summer Scholarships. Opportunities can be made in almost any clinical field as long as you have a supervisor. People who have undertaken scholarships in the clinical field have found them to be generally interesting as well as educational. □

L.U. 8T1

The Summer Of '79

Barbara Stubbs 8T1

This summer I did a preceptorship in family practice in Midland Ontario. This is a community of young families, retired people, bronzed summer visitors, Indians from Christian Island, and local farm people. Three hospitals serve this area, the Huronia District Hospital (where I spent most mornings), the Penetang General Hospital, and the Penetang Mental Health Centre. The Huronia District Hospital is a hospital clearly designed for the general practioner; it has a staff of twenty family doctors, three surgeons, an internist, a pathologist and an ophthalmologist. I was the only medical student there and I spent time with people in many different fields. My plan this summer was to concentrate on family practice, yet have time to explore related medical areas.

June was spent with Dr. Merilyn McTavish who is in partnership with two other family doctors - Dr. H.F. King and Dr. N. Grieve. From her I learned the basics of paediatric assessment, prenatal and postnatal care and general anaesthetic routines. In the mornings, I assisted Dr. McTavish in the O.R. where patients were anaesthetized for tubal ligations, D & Cs, biopsies, hysterectomies, etc. I learned how to scrub and gown, insert IUD's, and get along with the head nurse. I assisted the surgeon for several procedures and on one occasion performed a tonsillectomy. After hospital rounds there were house calls, a half-hour for lunch, then off to the office for a full afternoon. On my third day I made a solo home visit and was thrilled! I sought the remains of the second year Clinical Methods course for "doctor trademarks" and my lab coat and proverbial black bag did much to allay my insecurity.

From Dr. McTavish I learned many office procedures — pelvic examination, pap smears, vaccinations and hemoglobins. I often wondered what happened to the tissue biopsies, cultures and smears that were sent to the hospital. Several days were thus spent with the chief pathologist, Dr. Tremblay. I watched him prepare specimens and perform macro/micro assessments. It was my first exposure to therapeutically aborted fetuses and I was repulsed. We discussed many topics and issues, I spent time with the cytologist who showed me the complicated series of dyes for the pap smear test and I witnessed three autopsies.

The first two weeks of July were spent with Dr. I. Melnyk. He is an ophthalmologist and from him I learned how to examine eyes by means of the slit lamp and opthalmoscope. The trick is to use atropine. Lens prescriptions, cataracts, glaucoma, eye trauma and conjunctivitis were common cases. One day two security guards came in with a patient from Oak Ridge, the nearby maximum security psychiatric penitentiary. He was handcuffed to a waistbelt and had chains around his ankles. I was fascinated yet horrified at the same time. Imagine my concern when Dr. Melnyk handed me the ophthalmoscope and said, "Have a look, Barb!" This fellow had retinitis pigmentosa and was gradually losing his sight. I had to bend over, and there I was cheek to cheek with a convict. I was later informed that the man had raped six women.

Dr. Melnyk is known for his many successful cataract operations and I was fortunate to be able to attend one. The crucial moment is the removal of the lens through an incision in the iris. The lens is stuck to the end of a cryotherapy device, like a tongue to a popsicle.

I spent the remainder of July at the Mental Health Centre in Penetang, seeing the follow-up of patients we sent for psychiatric assessment. Under the supervision of psychiatrists I was able to interview patients and do admission histories and physicals. I witnessed electro-convulsive therapy (ECT) for patients with severe depression (an effective procedure that is not yet fully understood). The ward conferences held twice a week were stimulating. These were sessions involving psychiatrists, psychologists, social workers and nurses where individual cases were discussed and analyzed. I visited the alcoholic rehabilitation program, talked with its director and spent an afternoon in a group therapy session. I now feel more confident in being able to help alcoholics in family practice. Marital and family therapy was a program that was very exciting. I watched behind mirrors as social workers and

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psychologists opened up lines of communication between partners. It was like watching a hockey game since points were made and individuals scored!

On several occasions I took part in review conferences at Oak Ridge, the maximum security penitentiary. My picture was taken before being allowed through the gates and I was always accompanied by a staff member. These sessions were intense investigations of certain patients: their crimes, motives, environment and mental status. The psychiatrists have the difficult job of discriminating between the truly insane and those who can be helped. Afterwards, Dr. Stokes, the medical director, described to me the intricacies of the judicial system and major forensic psychiatric issues.

In August I was back to the relative safety of family practice, where I was supervised by Dr. H.F. King. By this time I had experience with office routine and would often do the initial assessment of patients. I spent a good part of my time counselling patients: teenagers seeking abortions, young newly separated husbands, people in middle life crises suffering stress, headaches and upset stomach. Dr. King and I would discuss these patients afterwards and I would get support in handling situations. In the mornings I was kept busy at the Huronia District Hospital with admission histories and physicals, and in my lunch hours I trained and was certified in CPR.

Dr. King encouraged me to follow up patients, and I spent time with the internist, the respiratory technologist and the physiotherapist. I witnessed a diabetic double amputee walk for the first time with handmade leg prostheses, a gratifying experience. I hope I can share my feelings of optimism with other diabetics I see in practice.

This summer experience has kindled my interest in family practice and I have gained confidence in myself. I am full of admiration and respect for those people who shared with me their skills, time and knowledge. □

The Medical Versus Surgical Treatment Of Unstable Angina

George Christakis 8T1

Unstable angina is the type of coronary artery disease characterized by an increasing frequency and severity of chest pain upon less and less exertion. It is usually associated with prolonged pain at rest (greater than 20 minutes) and is really in the continuum between stable angina and myocardial infarction.

The following article is a review of the current status of unstable angina.

Unstable angina (UA) was first reported in 1937. With the subsequent increase in knowledge about coronary artery disease, UA has undergone elaborate classification and even subcategorization. The need for subclassification of UA is evident when one considers the heterogeneity of the disease in terms of prognosis, clinical and laboratory presentation; for example, a difference in mortality and morbidity (MI or recurrent ischemia) has been shown in subgroups of patients with UA, based on ischemic ECG changes and serum enzymes, Table I. This work emphasizes the heterogeneity of UA and the importance of CPK serum enzymes in predicting the outcome.

A logical and workable subcategorization of UA consists of:
1) crescendo angina,
2) acute coronary insufficiency (ACI),
3) probable infarction (PI),
4) subendocardial infarction (SEI), and
5) post-infarction angina (PIA). This subclassification is based on duration of pain, occurrence at rest or with exertion, resting ECG changes, and serum enzyme changes. However, it does omit certain entities such as Prinzmetal's angina and progressive angina. Therefore, in order to avoid the confusion of semantics, UA is best described according to clinical symptoms, laboratory findings (ECG, enzymes) and any other standardized, reproducible criteria.

Even with a detailed and well-planned definition of the subcategories of UA, it is still possible to arrive at misleading results by the simple omission of certain seemingly unimportant criteria; for example, it is felt that there may be a different prognosis for those ACI patients that have ischemic ECG changes during their pain episodes from those without such ECG changes. Thus, the omission of one such criterion may explain why two groups studying the same subcategory of UA may obtain different results following treatment.

It has also recently been found that patients with an abnormal (ischemic) ECG have an increased risk (3x) of perioperative morbidity and mortality. Some critics suggest that the good surgical results for bypass operations on patients with classical ACI are due to the selection of patients with normal resting ECGs with the exclusion of those with abnormal (ischemic) resting ECGs.

Surgery vs Medicine

Recent work has centered largely on the comparison of the surgical versus the medical treatment of UA. It is especially important in a comparative study to ensure that the patient groups are similar with respect to clinical presentation, coronary artery anatomy, left ventricular function, risk factors, and, of course, subcategory of UA.

National Co-operative Study

In one large study, all of the patients had transient ischemic ECG changes associated with episodes of pain at rest. Evaluation of results was based on short and long term mortality and morbidity, and on functional capacity. In both surgical and medical groups the patients were similar with respect to age, number of previous MI's, mean blood pressure, mean heart rate, bypassable coronary artery lesions, ejection fraction greater than 30%, end diastolic volume less than 125 ml/m^2, number of diseased vessels and other important risk factors.

It was concluded that the in-hospital mortality and that in the thirty month follow-up period was the same in medical and surgical groups, irrespective of the number of vessels involved. The in-hospital rate of myocardial infarction was comparable in medically and surgically treated patients with one vessel disease (6%), but was higher for surgically treated patients with 2 or 3 vessel disease (although not statistically significant). However, overall, there was a 17% early MI

Table I
Morbidity and Mortality in UA Subgroups Based on Changes in ECG and Serum Enzymes

ECG and Serum Enzymes	Morbidity	Mortality
No ECG Change and No Change CPK	14% recurrent ischemia	0%
No ECG Change and + CPK	40% MI	20%
Ischemic ECG Change and No Change CPK	16% MI	7%
Ischemic ECG Change and + CPK	3%	15%

rate for all surgical patients and 8% for all medical patients (which was statistically significant). In a one year follow-up study it was shown that, irrespective of the number of vessels involved, there was an increase in class 3 or 4 angina in the medically (40%) versus the surgically (14%) treated group.

The rate of late MI's (after one year) was higher in surgical patients with one or two vessel disease, but higher in medical patients with triple vessel disease. None of these were significant at $P > .05$. The overall late MI rate was 11% in medical patients and 13% in surgical patients.

A problem exists in the interpretation of results of the rate of MI and death in the two groups, since approximately 36% of the patients in the medical group were operated on later with aortocoronary bypass (ACB) for uncontrolled angina. Unfortunately, this source of experimental error is common to all randomized studies comparing the two therapeutic alternatives. Therefore, medical therapy may actually be associated with higher morbidity and mortality than formerly thought, since, if medically treated patients had not undergone subsequent revascularization, they may have died.

In the National Co-operative Study all medical patients undergoing subsequent ACB were considered lost to follow up. Statistically, there was no difference in survival between the surgical groups:

a) all patients in the medical group
b) medical patients with later surgery
c) medical patients without later surgery
d) medical patients up to the time of later surgery.

To date, many studies have confirmed that urgent ACB can be performed on UA patients with reasonable safety and good clinical results. The National Co-operative Study, while it does support this statement, goes further to state that survival in those with intense medical therapy and subsequent surgery for refractory angina is at least as good as that of patients who undergo emergency surgery upon admission. No subcategories of UA were mentioned.

On the other hand, other groups believe that a preliminary period of intensive medical treatment before surgery may be advantageous since there is little evidence that survival rates are improved by treating UA as an acute surgical emergency. Furthermore, although surgery for UA may prevent late MI, the incidence of perioperative MI is great enough to offset this advantage. Also, most UA patients do not die or have infarctions within the first four days of admission to hospital, thus emergency surgery is not required.

It has been shown that UA patients and stable angina patients with the same amount of myocardial damage have the same mortality (3.3%) and perioperative MI rate (15%). These results suggest that the urgent surgical treatment of UA is at least as safe as the elective operation for stable angina. Results of subcategories of UA were not mentioned separately.

Comparison has been made between surgical and medical therapy of Intermediate Syndrome (recurrent angina, prolonged and intense but not related to effort), and for progressive angina (changing pattern and frequency of angina). These groupings correspond to PI and CA respectively, according to the system set out in the article. The results showed a significant increase in mortality and morbidity in patients treated medically for Intermediate Syndrome (eighteen month follow up). No difference was noted for patients in the subcategory of progressive angina.

While this work is important in that it studies mortality and morbidity within the framework of the subcategorization of UA, if has been criticized for being non-randomized and for including only the lowest risk patients in the surgical group. In fact, numerous studies have produced contradicting results.

A High Risk Subgroup

Aside from a difference in mortality and morbidity between subgroups of UA, there also seems to be a high risk group of patients with UA who do not fit into one particular group, but who have a very poor prognosis with medical therapy. These patients have frequent and prolonged attacks of angina continuing for 48 hours after bed rest and medical therapy in the coronary care unit. The incidence of MI within 3 months has been quoted to be 35-40% and the twelve month survival rate is 57%. In contrast to the benign in-hospital course of patients with UA who are responsive to medical treatment, the mortality and MI rate are 12% and 24% respectively in the high risk subgroup.

Surgical Results More Variable

The medical treatment of UA has changed in recent years due to better pharmacological therapy and coronary care unit regimes. The mortality and morbidity figures do not seem to be much more variable. This may be a consequence of:

a) differences in surgical technique between surgeons; for example, intermediate anoxic arrest versus cold potassium cardioplegia,

b) differences in surgical experience and talent between surgeons and hospitals,

c) differences in the type of patient chosen for surgery; that is, one subcategory may fare better with surgery than another, and finally,

d) the timing of the surgery; for example, an increased mortality has been shown in patients with crescendo angina who are operated on within 3 weeks of remission of the crescendo angina (24%), as opposed to operation in the 3-12 weeks after remission (5%).

Recent interest in UA research is concerned with the influence of the timing of surgery on morbidity and mortality. There should be some criteria for the timing of surgery with regard to a patient's clinical presentation, biochemical and ECG status, or other factors, to ensure minimal mortality and morbidity. Numerous studies report lower mortality and MI rate if a patient is treated medically and is well controlled before undergoing surgery.

Conclusion

The question of the most beneficial treatment of UA is currently unresolved. This is largely due to the perplexing abundance of terminologies for the various forms of UA, and partly because of the innate difficulty in constructing unbiased, well randomized studies. Also, one must consider that numberous factors are important in the success of surgery or medicine, and these have not yet all been well described. □

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chemically standardized coarse wheat bran product to healthy male medical students result in a significant reduction in high-density-lipoprotein cholestrol level. This may be unfavourable since an inverse relationship between high-density-lipoprotein cholesterol levels and the incidence of coronary heart disease has been established.

The discrepancy in effects of high fibre diet on lipid metabolism may also be attributed to the different fibre composition used in the diets. In comparing the effects of guar gum and wheat bran in lipid metabolism, Chen and Anderson found that the former exerts hypolipidemic effect while the latter does not.

Fibre and Gallstones

Certain kinds of fibre bind salts *in vitro* suggesting that fibre-induced loss of bile salt in the feces may reduce the risk ot gallstones. Meyer et al showed that fibre is ineffective in protecting obese subjects from cholelithiasis. Although fibre reduces the pool sizes and the physiological half-life of bile acids, the resulting acceleration of bile acid synthesis is insufficient to actually lower the level of cholesterol saturation of bile. their data suggest that a high-fibre diet actually may increase the risk of cholelithiasis by raising the saturation index of fasting bile.

Conclusion

Dietary fibre may not be the panacea, but the accumulated epidemiological and clinical evidence strongly suggest that fibre levels in the Western diet should be increased. The desirable effects of high-fibre diet are:

1) Increases speed of transit of food residues through the gastrointestinal tract.
2) Increases stool volume and contents of water, nitrogen and lipids.
3) Helps to fill the stomach and prevent excessive calorie intake.
4) Lowers fasting plasma glucose
5) Lowers serum cholesterol level depending on its composition.

It should be noted that no single one nutrient is solely essential to health. Nutrition comes from food, in variety so that it supplies all of the fifty-some known nutrients that are necessary for proper nutrition so as to provide the best of health that one's genetic or hereditary background permits. There is now increasing awareness to the role of nutrition in the prevention of illness, and the improvement of health. As the role of dietary fibre complex and its components in the diet becomes better understood, the subject of dietary fibre will be put in proper perspective. □

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patients raises intra-abdominal pressure and transmits it downwards to the leg and anal veins. The valves of these veins become incompetent, leading to varicose veins and hemorrhoids. This increase in pressure may also affect the deeper leg veins, causing endothelial damage and subsequent thromus formation. Another role for dietary fibre in relation to deep vein thrombosis and pulmonary embolism is via its proposed enhancement of fibrinolysis. It has been found that fibrinolysis is brisk in populations consuming low fibre diets. Studies done in an English hospital showed that addition of fibre to the pre- and post-operative diets of patients reduced the prevalence of deep vein thrombosis and pulmonary embolism. Also, rats fed an atherogenic diet were protected against thrombosis only if this diet also included fibre.

Conclusion

Although the evidence to date points strongly towards an association between fibre intake and cardiovascular disease, much work is needed before the stage is reached where specific dietary recommenations can be made. The strikingly different results of bran and guar gum supplements on serum lipid levels points to the need for further study of the mechanisms of action of the various fibre subgroups, their interaction with each other, and with other nutrients in the diet. The possible deleterious effects of high fibre intake, such as decreased absorption of essential trace minerals must also not be overlooked.

In a 1974 article by Burkitt, Walker and Painter it was stated that, "Fibre has been a largely neglected component of food, mainly because it contributes little nutritionally." Since that time, the work of these and many other researchers has shifted the status of fibre from that of neglect to one of avid interest, with a very promising role in the prevention of a myriad of chronic and life-threatening diseases. □

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I say yes. In any acute situation reaction were mental perception and functioning is altered—such instances as acute depression, alcoholism, drug use/abuse, adolescent or hysterical crises—the individual should be prevented from harming himself and treatment instituted to obtain mental clarity and health. Altered mentation may directly influence the perception and experience of pain, and suicide based on a false internal or external reality is not sane or logical.

In summary, I feel that suicide is a valid alternative to unbearable pain; it may be the only logical alternative in certain circumstances. □

J. Simpson 8T1

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may ask about the legitimacy of suicide when the final decision is made clearly and lucidly by those in emotional or physical pain. It should be obvious, however, that anyone in such a dire position is not capable of making a free, unclouded decision, but rather is being coerced by their pain and their lack of options. We must blame ourselves for not providing the alternatives to those who come seeking our aid. It is well-known that we as physicians undertreat chronic physical pain: we have no time to talk, we are concerned almost solely with physical disease and not the person who must bear the ailment and we have no time to treat the emotional suffering. All these things are within our ability to remedy and yet instead of offering our help and our compassion, some would have us offer a gun.

The suicide victim, therefore, represents a failure; a failure on our part to reach out and help those unable to cope with their suffering, be it emotional or physical. Everytime a human being kills himself, we have failed to offer him a chance to make a truly free decision, not one forced upon him by his pain and torment. The person who attempts suicide is asking for our help in relieving his physical hurt, emotional anxiety or mental depression. We have at our disposal the means to offer him assistance in coping with these problems yet our failure to do so is surely the greatest negligence of all.

As physicians, as healers, but more importantly, as human beings we must give the suicidal person the help he asks us for in preventing his death from depression or pain and offer him the hope he needs to go on living in dignity. □

Frank Lista 8T1

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with evidence of abnormal liver function tests.

Conclusions

Hemophiliacs transfused with cryoprecipitated or lyophylized factor concentrates have an increased prevalence of abnormal liver function tests and positive hepatitis B status, which can be related to changes in hepatic pathology.

A sample of forty-nine factor VIII- or IX-deficient hemophiliacs from South Western Ontario did not demonstrate any evidence of clinical hepatitis at an annual assessment. Nevertheless thirty of the forty-nine had abnormal liver function tests. Furthermore four patients of six who showed evidence of recent or current hepatitis B infection had abnormal tests compared to one of six hepatitis B antibody-negative individuals. No specific relationship could be demonstrated between the above results and transfusion with lyophilized versus cryoprecipitated factor concentrates.

This study substantiates the need for improved surveillance of hemophiliacs receiving blood transfusion products on a regular basis. Such surveillance must include the keeping of careful records regarding all concentrate used, regular hepatic and hepatitis testing and following of all unusual clinical symptoms and signs. This information can be subsequently used to provide both more appropriate transfusion products and more appropriate therapeutic manoeuvres for the overall welfare of the hemophiliac. □

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crease in bran may cause diarrhea until the G.I. tract is given an opportunity to adjust. Very large amounts of fibre can result in enlargement and twisting of the sigmoid colon, a condition which occurs in Africa but rarely in Europe. Nonetheless, fibre is still a desirable addition to the diet as long as a degree of reasonableness is maintained in its consumption. □

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